FLIGHT

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Dec. 17. "Control Beyond the Stall," Lecture by Dr. G. V. Lachmann, before R.Ae.S.
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EDITORIAL COMMENT

REFERENCE was made in these pages in our issue last week to the statement in the House of Commons by Sir Philip Sassoon, Under-Secretary of State for Air, that as a result of recommendations of the Committee on National Expenditure, certain new civil aircraft types which it had been intended to order would not be proceeded with. Sir Philip was rather vague when he spoke on the subject in the House, and most people, we among them, certainly assumed that the high-speed mailplanes would be built. Information since received indicates that at the moment no definite decision has been taken, but, as one of the great daily newspapers has stated that the new mailplanes have been abandoned, it would appear advisable to make certain comments on the position. One thing should be made clear at the outset: The Air Ministry is fully alive to the importance of the new fast air mail machines, but all expenditure of this nature has to be sanctioned by the Treasury, and at the moment the matter is "under consideration." The daily paper referred to is a little "previous" with its announcement, to say the very least, and it may be—we hope so most sincerely—that time will show it to be entirely wrong.

False Economy

In order to appreciate the position, it is necessary to go back a good many years. At the end of the war, 1914-18, commercial aviation made its first faltering steps with, at first, military aircraft types slightly modified. Later modifications were more far-reaching, and even extended to such drastic measures as to fit a "conservatory roof" on an otherwise standard tractor biplane! The result was not a commercial success, but the machines did excellent work, and got through in a surprisingly large percentage of cases, mainly due to the courage and determination—not to use a more high-sounding expression—of the pilots.

Then came a period during which we began to design specially for commercial aviation, but in those days, as indeed up to the present time, we had so to design our machines that they could be used for carrying mails and passengers. That system worked well enough while commercial aviation was finding

its feet. But like all compromises it failed to give the maximum of efficiency in any one direction. While British air routes were confined to the London-Paris service, that was of no great moment. Gradually the British air net has been spreading—slowly unfortunately, but still spreading—and during its growth we have clung to the system instituted in the earliest days of commercial aviation and built our aircraft for passengers and mails, with the former pay load predominating. There was some excuse for this. As Mr. Handley Page once said, it is so much easier to persuade 160 lb. of passenger to travel down to Croydon, get into an aeroplane, fly across to Paris, get out at Le Bourget and travel by car to the centre of Paris, than it is to transport and distribute 160 lb. of mails in the same manner. The passenger does much of the minor transport unaided. The mails have to be handled at every stage.

The advent of long-distance Empire air routes has put quite a different complexion on the subject of air mails. In other words, we have come to the parting of the ways, as was predicted in FLIGHT several years ago. The passenger, to return to Mr. Handley Page's remarks, unconsciously helps the air transport company quite a lot. But in return he demands a standard of comfort which His Majesty's mails do not require. For his 160 lb. or so of weight he demands a good many cubic feet of space. That means a large fuselage or boat hull, whichever type of aircraft is being used, and a consequent increase in drag and horsepower. He demands a reasonably comfortable chair to sit in (and sometimes he gets it), which means extra weight and a consequent reduction in pay load. He demands that noise shall be reduced to bearable proportions, which means extra weight again and a further reduction in pay load. The cumulative effect of all these things is to make it a very costly business to increase greatly the operational speed of a passenger-carrying aircraft.

The mailplane, on the other hand, *can* be designed for greater aerodynamic efficiency and much higher cruising speed, because for their weight the bulk of mails is small—at any rate when compared with a human being. But so long as we stick to the old policy of machines carrying both mails and passengers, the operational speed is being kept down because of the passengers, for the reasons outlined above. If we are to make full use of the time saving which aviation has to offer, we *must* design specially for the mails and for a higher cruising speed.

The Air Ministry has realised this for some considerable time, and in the spring of this year it was announced that a competition for mailplanes was to be held. The announcement was made just about the time the late Com. Glen Kidston made his record flight to the Cape, and the specifications were generally thought to be Britain's reply to the fast air mail problem. As such it had excellent effect, and everywhere the production of the new machines was looked for eagerly. Now at last Great Britain was about to show the world what a really fast air mail machine should be. In high-speed aircraft Great Britain is supreme, and in many types of military aircraft she can more than hold her own. But she has never made a serious attempt to produce a fast mailplane, although the type is urgently needed. The specification, broadly speaking, called for the carrying of 1,000 lb. of mails over a distance of 1,000 miles at a still-air cruising speed of 150 m.p.h.

Compared with any commercial aircraft which we had hitherto produced this was a formidable problem. The designer was, it is true, left a free hand in the manner in which he would tackle it. He could make his machine single-engined or multi-engined. He could make it a monoplane or a biplane. He could, presumably, please himself whether he used air-cooled or water-cooled engines, although the question of maintenance would obviously have to be taken seriously into consideration. But a cruising speed of 150 m.p.h. carrying such a pay load over such a range was a "teaser." Nevertheless, British designers set to work, and it is indicative of the seriousness which British aircraft firms attached to the competition and to the type that no less than 22 tenders were submitted. Those who know what it costs merely to design an aircraft—quite apart from any question of subsequent construction—will know that these 22 designs must have cost the British aircraft industry a very large sum of money. If the order were not to be placed after all it would represent a very serious loss to the aircraft industry, not to mention that cancellation would be a moral if not a legal breach of faith.

It is not even as if the type was one which was not very much wanted, or the production of which could just as well be undertaken a few years hence. The mailplane is very urgently wanted, and delay may readily have consequences the extent of which cannot at the moment be foreseen. Other countries are hard at work on the same problems, and it is by no means a stretch of the imagination to visualise that by delaying the production of our mailplanes other nations may get such a lead that shortly British Empire mails will be carried largely in foreign aircraft. Already the Dutch East Indian air mail is showing what sort of competition we have to reckon with, and others will undoubtedly see their opportunities elsewhere in the Empire. Thus the matter is not one which we can afford to regard complacently as a parish affair of no great importance. The whole subject of Empire communications is involved, and the holding of the Empire Conference lends fresh point to the argument.

Then there is the effect which cancellation of the order would have on the British aircraft market. In military types it is a well known fact that as soon as a certain type has been accepted by the British Air Ministry, it is very much easier to sell it abroad. Such has now become the standing of British service aircraft that potential purchasers abroad are very much following the principles of the old song, "What is good enough for Nelson is good enough for me." We are quite certain that many of the designs for mailplanes would find a market abroad. But the foreign purchaser is, very naturally, sitting on the fence and waiting for the first machines to be produced so that he can see for himself what sort of practical qualities the machines can be counted upon to have. If no order is placed, he will defer the placing of his order, and very possibly go elsewhere.

From every possible point of view it is to be hoped that the Treasury may be convinced that the cancellation of the order for mailplanes would be very false economy.

FLIGHT PHOTO.

The Return of Bert Hinkler

Three Minutes late at Hanworth

SCENE: A perfect English winter day at Hanworth aerodrome; blue sky above and the low sun shining through the slight ground mist. A large force of foot and mounted police to keep the crowd from rushing the aerodrome and possibly damaging the "Puss Moth"; a very select party of eminent air folk in the club enclosure, and a complete absence of any crowd whatsoever—such was the setting for the return of Sqd. Ldr. Bert Hinkler, A.F.C., D.S.M., from Canada via New York, Jamaica, Maracaibo, Trinidad, Brazil, Gambia, Spain and France. It was certainly a different scene from that at Croydon in 1927 when Lindbergh flew over from Paris after his solo crossing of the Atlantic. It was, none the less, much more comfortable for Bert Hinkler's friends who wanted to have an intimate chat with the great little man after his 18 months of absence from this country and his many adventures.

His arrival had been timed for 14 hours, and we knew that Bert has his own ideas on the subject of punctuality. He left Le Bourget, so we were told at Hanworth, at 12.15. By 2 p.m. all was in readiness for his arrival, and three minutes later a silver "Puss Moth" with red struts and the Canadian registration letters CF-APK flew unostentatiously across the bright blue of the sky and circled round to land. Various light aeroplanes had been buzzing up and down all the morning, and had it not been for the hour and the Canadian registration marks, the arrival of the hero of the day might well have passed unnoticed.

With N.F.S. mechanics on his wing tips he taxied into a roped enclosure in front of the club sheds. Through the windows we could see the pilot taking off a soft felt hat, which doubtless he had worn all the way from America. One cannot imagine Bert Hinkler buying new clothes in the course of a flight in order to make a well-groomed appearance on arrival. He stepped out of the machine looking not one whit different from the Bert Hinkler who flew the Avro "Baby" to Turin. He was wearing a dark suit, somewhat the worse for the attentions which he always pays to his engine when aground, a woolly sweater under his coat and a little yellow badge in his buttonhole. At once the pack of photographers set to work and wreaked their wicked will upon him, with endless requests to "hold up your hand again" and "give us a smile, Mr. Hinkler." Then he was carried shoulder high to the platform, where he was welcomed by the Under-Secretary of State for Air, Sir Philip Sassoon, and the other Big Noises. Mrs. Hinkler was there, dressed most becomingly in black with a black hat, and a white fur round her neck. The Air Council was represented by Air Marshal Sir Geoffrey Salmond, the civil side of the Air Ministry by Col. Shelmerdine, the Royal Aeronautical Society by Mr. Griffith Brewer, and the Master of Sempill was also there.

THREE MINUTES LATE! Bert Hinkler's "Puss Moth" arrives at Hanworth from New York (via Jamaica, Trinidad, Brazil, Gambia, Spain and France.) (FLIGHT *Photo.*)

Apologies were made for the absence of the High Commissioner for Australia (Sir Granville Ryrie), and of Mr. Stanley Bruce, late Prime Minister of the Commonwealth, both of whom sent regrets at their inability to welcome their famous countryman.

The Prime Minister sent Mr. Hinkler the following telegram:—"Only an urgent official engagement prevents my having the pleasure of welcoming you personally at London Air Park to-day on your arrival from New York via the South Atlantic, Africa and Western Europe. I have eagerly followed every stage of your flight, and am convinced that it will undoubtedly rank as one of the most remarkable achievements in the history of aviation and is a magnificent demonstration of the sterling qualities of British aircraft, aircraft engines and air pilotage."

A message from Lord Stonehaven was as follows:—"Regret deeply impossible return from Scotland to meet you on termination your outstanding achievement. My heartiest congratulations and welcome to Hanworth Club."

Sir Philip Sassoon then broadcast his speech of welcome, speaking of Hinkler's "magnificent deeds in aviation" and his last great achievement by making the first light aeroplane flight across the South Atlantic. Hinkler replied, somewhat inaudibly (perhaps he was still a little deaf from the noise of his "Gipsy III"), and offered his thanks to Lord Wakefield, whose help, he said, had made the flight possible.

Then four other men who had flown the Atlantic were presented to Hinkler, M. Lotti, Sir Arthur Whitten-Brown, Sqd. Ldr. Booth and Lt. Meager (both the last two having been officers in R.100). Flt. Lt. Stainforth was also introduced to Hinkler. It was a most imposing collection of great airmen, and the idea of getting them together was a very happy one. One is rather apt to forget that Hinkler had this in common with Stainforth, that both have been Schneider pilots, though neither has actually flown in a Schneider race. It is one penalty of doing a great deal that some of one's exploits are apt to be forgotten; and no one pilot has been so versatile and has accomplished so much as Hinkler has done. We can only think of one other Schneider pilot who has also been a long-distance pilot, and that is the Italian officer, Ferrarin.

After this pleasing little ceremony had been finished, Bert Hinkler was brought into a hangar and handed over to the tender mercies of the rest of the journalists. He still spoke rather low, but he was just the same calm, droll, little Bert as ever, and he chatted away with a glass of something yellow and bubbly in his hand, puffing intermittently at a "gasper." Bert is one of the most abstemious of men, and will only relax from his stern asceticism after all possible flying has been finished. He well deserved his glass, but all the same he looked as fresh as paint and not at all as if he were in need of it.

THE ADDRESS OF WELCOME: Sir Philip Sassoon, Under Secretary of State for Air, broadcasting his speech of welcome to Bert Hinkler (left). Mrs. Hinkler may be seen on the right. (FLIGHT *Photo.*)

ATLANTIC FLIERS, OLD AND NEW: Bert Hinkler (centre) is introduced by Sir Geoffrey Salmond (left) to Sir Arthur Whitten-Brown, who flew the Atlantic in 1919.
(FLIGHT *Photos.*)

Straightway I asked him "Why did you do it, Bert?" and he grinned in his whimsical way as he replied "I don't know." Then he went on to tell us that he had tried to bring off some scheme of his own in Canada, and had bought his "Puss Moth" for that purpose. When he met with no success there, he thought he would try how things were in South America. He summed up all possibilities, and tested his machine. He was satisfied that he had tanks which would enable him to fly where he wanted to go. His flight to Jamaica was a test flight, and no light one. He had no navigation lights on his machine. (I regret to say that Hinkler has adopted the American habit of speaking of an aeroplane as a "ship." In the English language, I may remind him, the only aircraft which is so referred to is an airship.) Therefore he could not make a long enough flight starting from and landing on American soil. So he left New York in the afternoon at 2 p.m. and landed at Kingston next morning at 8 a.m. No one could say aught to him because he flew across the open sea by night. But he said that it was a very trying trial. He had no lights over his instruments, and he trusted to the moon to enable him to read them. But he ran into a bad storm, and so the moon was not able to do its part. However, he had two compasses and one of them was luminous, so he got to Kingston all right. This flight was a good test of his success in navigation. It was 1,800 miles in length.

Asked about how he managed to navigate, he said that of course it was all done by dead reckoning. There were many ways in which he could check his drift while flying over the sea. Often a cloud gave him a point to calculate by. He had no flares with him, and so he could not drop them. He did not have his compass swung after each stage of his flight. He had two, and he was always checking them as he flew. His tanks gave him a capacity sufficient for 25 hours at a cruising speed of 100 m.p.h. He always kept his eye on his clock. The clock and the direction were most important. If he had to deviate to get round a storm, he flew for so long in one direction, and then for an equal time on the other tack to get back on to his course.

He stayed 10 days in Jamaica, and then set off for Maracaibo, in Venezuela, a flight of 620 miles. He was asked about the story of his being arrested there, but merely grinned, and answered "If drinking beer with the Governor in his garden is being arrested——." On that flight he had a further test of his navigating powers, for when he started the wind was blowing in one direction, and when he arrived it was blowing in exactly the opposite direction. Still he got there.

Then he got on to talking about his Atlantic flight, though still keeping silent about the motives which prompted him to undertake it. When he left Natal he had an overload of 500 lb. and he flew about 5 ft. above the water. When it got dark he could not see the water, and he had to climb. At 8 p.m. he met storm clouds, "real blocks of concrete," which stretched up to perhaps 25,000 or 30,000 ft. He could not climb above them, but he went up to about 12,000, and flew through them until 2.30 a.m. the next morning. When he got into the clouds "then the fireworks started." He had never before seen such lightning. From close quarters the streaks of flame looked "like a telegraph pole," and he always thought that the next would go right through the "ship."

Asked why he had made Bathurst instead of Dakar, he said that he never intended to make Dakar. He actually aimed at a point some miles south of Bathurst, because it was a point easy to recognise, with a group of islands on his right. He made land within 10 miles of that spot. Obviously he much preferred to land on British soil.

Asked if he carried a rubber boat, he said that if he had flown into the sea he did not think that he would have been much interested in rubber boats. But he had tested out his "ship" thoroughly, he had confidence in it, and in his own powers of navigation.

I asked him if he intended to carry on work with his "Ibis" amphibian, and he said that he certainly did if he could raise the money.

F. A. DE V. R.

On December 8 the Master of Sempill gave a supper party at the Dorchester in honour of Bert Hinkler and Dr. Hugo Eckener, who is on a visit to England. The same evening Hinkler broadcast a talk from the B.B.C. on his flight.

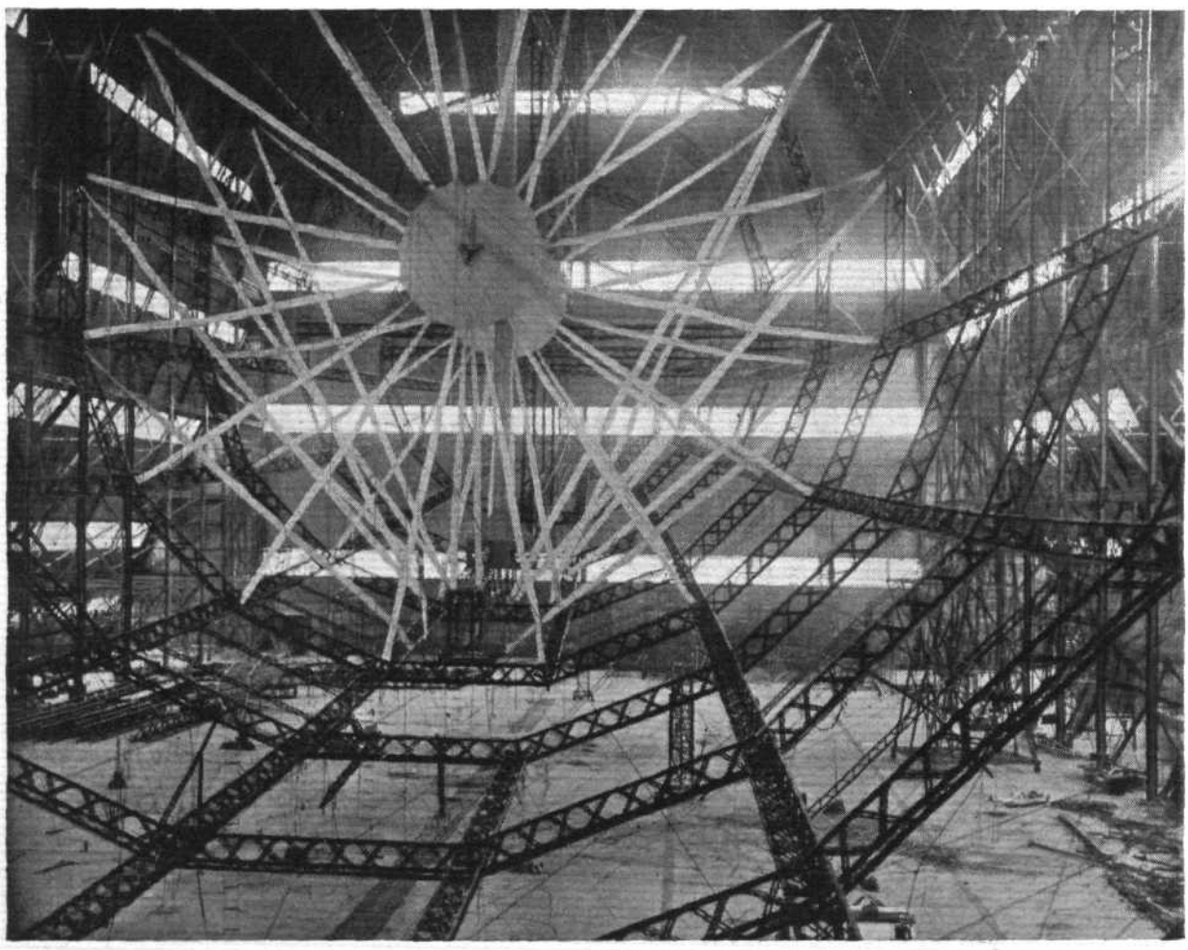
The Royal Aero Club is giving a House Dinner on Wednesday, December 16, at 7.30 p.m., to welcome back Sq. Ldr. Bert Hinckler. Members wishing to attend are requested to apply to the House Secretary, Royal Aero Club, 119, Piccadilly, W.1.

ON ENGLISH SOIL ONCE MORE: Bert Hinkler taxying in his "Puss Moth" after landing at Hanworth.
(FLIGHT *Photo.*)

Breaking up R.100

MEMORIES of many pleasant visits to Pulham, Howden and Cardington were awakened by the journey to the Royal Airship Works on Thursday, December 3, to witness the destruction of R.100 by the workmen of Messrs. Elton, Levy & Co., Ltd. All previous visits to airship stations were characterised by a spirit of hope and progress. A band of enthusiasts, full of belief in their own craft of the air, and extremely convincing in the arguments by which they supported their belief, always made the visitor very welcome, especially if the said visitor was prepared to take an intelligent interest in the subject of airships. A more delightful set of hosts it would be impossible to imagine, and the arguments which they used, if still not proved by practice, are still unrefuted. It was true that on those visits one sometimes had to say good-bye to a particular airship which had made a name, but had outlived its usefulness. Gallant old R.33 comes first to the mind; and the wisdom of breaking her up when we had no other airship in which to train and practise crews is still in question. Regret was felt, too, when the doom of R.36, with her passenger saloon, was pronounced. No tears were shed over the unfinished framework of R.37, or the interesting little R.80, or the two surrendered Zeppelins, all of which went to the airship knackers. In those days one was always looking forward to something bigger and more advanced. R.100 seemed to fulfil those expectations. It is true that she was experimental, and at the utmost only pointed the way to better things; but still she did fly the Atlantic twice with ease, and she survived the dreaded ordeal of a storm with violent rising air currents. She accomplished a good deal, and at the same time she asked a lot of questions which could only be answered by further trial and experiment. Admittedly the nation is too poor at the moment to pursue those investigations, but one wonders, is it really so poor that it could not have afforded a small number of men to keep the framework in order until such time as the experiences of Germany and the United States should have enabled us to decide definitely whether it would be worth while to carry on or to close down? Is the nation so poor that the price received for some 50 or 60 tons of scrap duralumin was a consideration sufficient to deprive the future of the chance of making a free decision?

As I entered the shed at Cardington last Thursday the sound of hammers at work came to my ears. Then, passing through the offices into the main shed, the skeleton of the great airship met my eyes. The breakers had been at work for a week, and they had already made considerable havoc. The main longitudinals and transverse rings were still in place, slung from the roof. Wooden props supported the passengers' coach and the control car. The passenger quarters were being rapidly dismantled. The gangway from the nose to the quarters had been removed intact. Mr. Elton, with whom I travelled down from London, said that there might be some use found for that, and it would be a pity to break it up. I was surprised to find what a pleasant companion Mr. Elton is. I had expected to find him a sort of Jack Ketch; but actually he seems to consider his vocation in life is the beneficent one of preventing waste. He had many interesting stories to tell of how he had retrieved metal from all sorts of unlikely places, where others thought that it would be no good for anything, and had made it available for the further service of mankind. I suppose that it had never occurred to him that anyone might have a sentimental affection for R.100 and feel it a desecration to see the axes at work on her once beautiful duralumin structure. He reckoned that the work of converting the ship to scrap would take some three months. The bays



Inside the frame of R 100, looking aft: it will be noticed that sections have already been cut away. The white fabric discs and strips are an experimental device to prevent parts of the gas bags wrapping round wires. The bay enclosed by these discs will be kept for experiments. (FLIGHT *Photo.*)

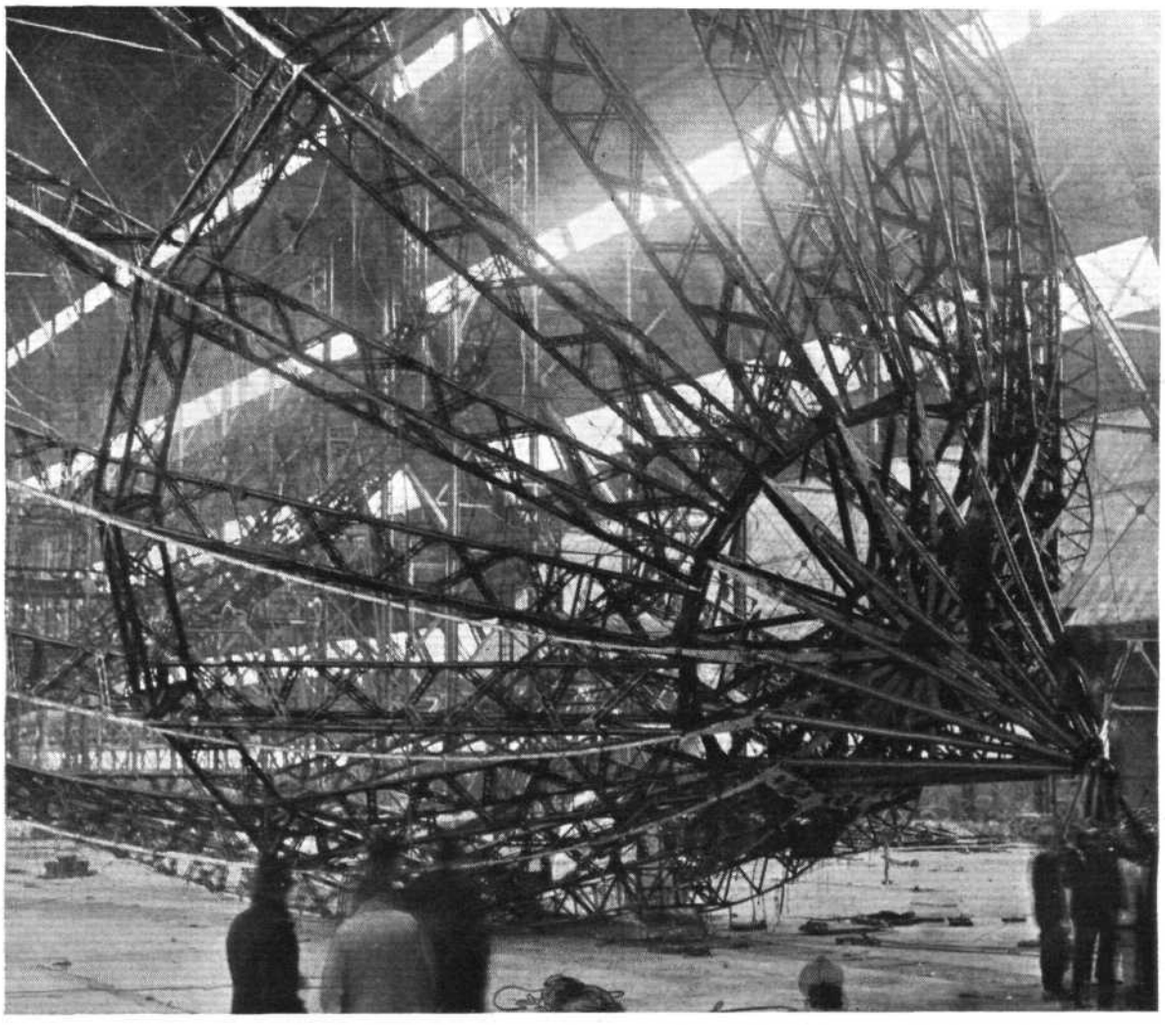
would be lowered one at a time to the floor, and broken up so far as axe and saw and blow-lamp could accomplish it. He thought that a steam roller would have to be used to flatten out the main girders before they could be carted away.

On one side of the shed the beds, kitchen equipment, tables, etc., were all neatly stacked. The beds have only three legs apiece, the framework itself having supported the fourth corner. They are light and strong, and yachtsmen may find them a good investment. I was rather taken by a little ladder, used, I suppose, for climbing into the upper bunks, which would be an acquisition to, say, a library. Some sections of the framework may be disposed of intact, and there have been inquiries for sections of certain dimensions. One can imagine that some sections might serve as useful bridging material for surveyors or explorers, perhaps in Africa, who need lightness combined with strength. Two of the fins were already on the floor, and for a while I watched a workman with a heavy axe cutting the lighter webbing away from the girders. But I found the sight too brutal, and speedily turned away. Talk about breaking a butterfly on the wheel!

One bay, I think it is No. 11, aft of the centre, is to be kept for experiment. On each side of it were large discs of fabric connected by radial strips of fabric to the transverse rings. Sqd. Ldr. Nixon explained to me that these discs were an experiment to prevent sections of the gas bag from wrapping round the wires, as they sometimes were inclined to do. Various experiments were in progress when the work was stopped. Outside the shed was a large frame covered with a panel of fabric. Underneath the fabric ran a number of wires, to which the fabric was attached at various points by pieces of cord. The cords were secured to the fabric by various methods. This represented some experimental alternatives to the original method of securing the cover to the framework, which had been criticised a good deal, and which had, as a matter of fact, led to a good deal of rain getting inside the cover. This panel had been out in all weathers for several months, and none of the points at which the cords were attached to it had leaked at all. I remarked that this showed how much more experiment was desirable, and the reply was: "That is just where R.100 would have come in so useful."

I returned to the shed, in time to see the nose section of the ship lowered to the ground. The transverse ring had been disconnected from the longitudinals. The supporting ropes, which passed over pulleys in the roof and were secured to weights on the floor, were loosened, and the whole section came to the ground with a grinding noise which re-echoed fearsomely through the vast shed. The hatch by which crew and passengers used to embark and disembark was still covered with fabric, and it hung limply down like the mouth of a dead creature until the nose section rolled forward on the floor, and forced the hatch to shut. I have been in dissecting rooms more than once, but I dislike them. So I was glad to leave the shed and the horrid work that is going on inside it.

Cardington is to be reduced to a "care and maintenance" basis; but those in charge will care for the place and will maintain the sheds, the mast, and hydrogen plant, etc., in good condition. I believe that the mooring tower will be used for experiments with kite balloons. So, if the results of the present work on airships that is going on in Germany and the United States should have the effect of deciding us to resume airship work when our national pocket is a little less empty, the Royal Airship Works will be ready to use. We shall not have an airship, and we shall not have a crew in training. The price of the scrap duralumin will have been spent—swallowed up in the vast maw of our national expenditure. So if, for example, the Admiralty clamours for airship cruisers as a great measure of efficiency and economy (as it seems almost certain that they would be), we shall have to start building and training afresh, possibly under foreign guidance, and certainly at vast expense. However, R.100 is



The nose of R 100 lowered to the floor to be broken up. The structure is slung from the roof of the shed, and is being lowered section by section. (FLIGHT *Photo.*)

now spilt milk, and to shed tears over its fate would be almost as profitless as to hope to pay our national debt by selling scrap duralumin.

F. A. DE V. R.

R.100 in the Commons

On Wednesday, December 2, Lord Scone asked the Under-Secretary of State for Air in the House of Commons to give an estimate of the annual cost of preserving the framework of R.100 on a care and maintenance basis had this course been preferred to selling the framework as scrap.

The Under-Secretary of State for Air (Sir Philip Sassoon) : It is estimated that the cost of material and labour necessary for preserving the framework of R.100 on a care and maintenance basis would have been approximately £1,000 per annum in direct charges. This figure, however, makes no allowance for the occupation of the airship shed and for other overhead charges of the Royal Airship Works.

Lord Scone asked the Under-Secretary of State for Air what use it is proposed to make of the houses, offices, hangars, workshops and hydrogen-producing plant at Cardington ; and what annual outlay their maintenance is likely to involve?

Sir P. Sassoon : Some of the houses will be occupied by the care and maintenance party and the remainder will be let to suitable applicants for housing accommodation. The hydrogen-producing plant will be closed down, the use to be made of the offices, hangars and workshops no longer required for airship purposes or for the care and maintenance party, is still under consideration. The annual cost of maintenance cannot therefore be exactly stated at present ; it will probably be in the neighbourhood of £4,000.

Capt. Sir William Brass : Can the right hon. Member say whether the hydrogen plant will be kept or sold?

Sir P. Sassoon : It is being kept. The cost of maintaining the hydrogen plant in its present condition is included in the figure of £4,000.

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THE AIR LEAGUE DINNER TO MISS SALAMAN

MISS PEGGY SALAMAN, on December 2, was the guest of honour at a dinner given by the Air League of the British Empire at the Dorchester Hotel. Owing to the regrettable absence of His Grace the Duke of Sutherland, who was confined to bed with influenza, Kathleen Countess Drogheda took the chair.

After the Loyal Toasts, LADY DROGHEDA proposed the health of "Our guest." She announced with great regret the indisposition of the Duke of Sutherland and read a letter from him, in which he congratulated both Miss Peggy Salaman and Mr. Store on their magnificent flight. The High Commissioner for South Africa, Lady Drogheda said, also expressed his regret at being unable to be present. Telegrams were read from Mr. Gordon Store himself and also from Miss Winifred Spooner. Lady Drogheda laid great stress on the fact that Miss Salaman's flight was an all-British achievement, and that it was made possible by the spirit of adventure which is a heritage that young English people still possess. She also welcomed the fact that Mr. and Mrs. Store were present to represent their son, and announced that the Air League were sending a wireless message to Mr. Gordon Store expressing their regret at his absence.

LT. COM. J. M. KENWORTHY supported the toast in a somewhat lengthy speech. He announced that the Air League existed for encouraging aviation and that it was therefore fit and proper that the League should pay tribute to the spirit shown by Miss Salaman. She did not, he said, undertake this flight for self-advertisement, but solely for the good of aviation, and, as such, they were greatly indebted to her. He also stressed the fact that their light aircraft was entirely British.

MISS PEGGY SALAMAN herself, in responding, read a very interesting account of her flight, throughout which she used the pronoun "our" when referring to the flight, and at all times declaimed any credit to herself for what had been achieved. She said that she was not the person to whom tribute should be paid, as she was only a minor part of the crew of the *Good Hope*. Mr. Store, she said, was responsible for the navigation, for the chief part of the piloting, for effecting the forced landing and for landing and taking off at the majority of the aerodromes, particularly those where the rarified air made getting away conditions difficult ; he also was responsible for the maintenance and good running of the engine. Her part, she said, was to relieve Mr. Store when the flying was straightforward (in order that he might get some rest) and to look after the general organisation such as customs, log book, sending telegrams and dealing with the ground side generally. Neither of them, she said, had more than 20 hours' sleep during the whole trip, and they helped each other to the best of their ability. Her description of the various stages of the flight was very clear, but was in the main a recapitulation of the information which has already appeared in these pages. She would, she said, like to thank everyone for the wonderful reception accorded the crew of the *Good Hope* everywhere they landed, and by way of conclusion emphasised that no words of hers could express the overwhelming gratitude she felt to Mr. Gordon Store. At the end of her speech Miss Peggy Salaman was presented with a small model of the *Good Hope* from the Duke of Sutherland.

SIR ALAN COBHAM then proposed the toast of "British Aviation." His speech was emphatic in claiming that everything good came from "youth." This flight, he said, showed what youth could do. De Havilland himself had designed his early machine when he was very young, he said, then quoted several other similar examples. Old men, he said, could never be wrong because they never did anything. People had often asked him, he said, what good such stunt flights as these could do. His answer was invariably that they were the forerunners of practical propositions. It was over seven years ago that he himself had made roughly the same flight as Miss Salaman. On that occasion it took him 14 days to get home, and now already we had arrived at the stage when regular air mails were about to run to the Cape. Sir Alan dilated further at length on the value of youth to "ginger up," as he put it, the inventions and ideas of older people. He also pleaded that nowadays we should reckon distance in time and not in so many miles, and in conclusion said he visualised a flying speed of 1,000 miles an hour before very long.

ADMIRAL MARK KERR proposed the health of the Lady Chairman. He eulogised her and recounted much of the good work for which she had been responsible. He aired at length a grievance against those who had deprecated the idea of this dinner at its conception, but he pointed out they had triumphed over their detractors and felt sure that everyone would agree the dinner was a great success. After this Admiral Kerr indulged in a morass of Abyssinian history, at times a little difficult to follow. He referred to a flying machine which King Solomon had presented to the Queen of Sheba and drew parallels which, together with stretching the etymology of the names, connected those of King Solomon and the Queen of Sheba with those of Miss Peggy Salaman and her mother.

LADY DROGHEDA replied in a few words of thanks, and asked those present to drink the health of the Duke of Sutherland, who, in spite of his indisposition, had been able to telephone.

Some 200 members and their friends were present, and after dinner they repaired to the dance floor of the hotel.

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Maj. Savage's Grid Searchlight

MAJOR SAVAGE, of sky-writing fame, has produced a novel type of searchlight which may well alter the whole conditions of night bombing. The light is reflected from 300 mirrors, and can be thrown in various shapes up to a height of at least 15,000 feet. The light is electric and is of 3,000 million candle-power. The origin of the idea was advertising by night, and the words "Buy British" have been projected on to the sky at night. For defence purposes it is expected that a grid pattern will be most useful, as the height and speed of a bomber can be calculated from the time which it takes to pass from one bar of light to another. A single bar of light can first be projected, and the pilot of the bomber is unable to see this until he finds his machine lit up. Then it becomes almost impossible for him to escape, for the rest of the grid can be thrown up all round him. The whole apparatus is mounted on one lorry.

Private Flying & Club News

THE HAMPSHIRE CLUB AT PORTSMOUTH

THE Hampshire Aeroplane Club held their Sixth Annual Dinner and Dance at the Guildhall, Portsmouth, on Friday, December 4. The Rev. E. Bruce Cornford (Vice-President of the Club) was in the chair and the guest of the evening was Councillor Walter Gleave, the Deputy Lord Mayor of Portsmouth.

COL. THE MASTER OF SEMPILL proposed the toast of "British Aviation and the Club." In doing so, he said that the Hampshire Club had the record of being one of the most active organisations of its kind in the British Isles. Its activity, he said, could to a large extent be judged by the fact that early next year it was to move to the new municipal airport of Portsmouth, and would in future operate from there instead of at Hamble. This airport, he went on, was undoubtedly one of the finest in the country, and the credit for it was due to the foresight and energy of the municipality. Col. Sempill regretted that aviation had not made the progress expected of it within the last few years, but, he said, this was certainly not due to a lack of enthusiasm on the part of the flying clubs. What was wanted was a more genuine and real air consciousness in the country, and it was necessary that we should inculcate a normal habit of travelling by air and sending mails by air in everyone. The valuable work of the clubs was not, he felt, being fully appreciated by the Government and he voiced a plea for the clubs to work together and present a united front to the Government, particularly when the question of subsidy came up for revision, so that they might, if possible, get the Government grants increased. He said that the southern headquarters of the Royal Naval Flying Club were to be the Hampshire Aeroplane Club, and that this former, which already had nearly 100 members, would be a great power in assisting the Hampshire Club's prosperity, now that it was going to the cradle of the senior Service. Col. Sempill then referred briefly to the presence of Flt. Lt. Stainforth and to the arrival of Sqd. Ldr. Hinkler which would, he hoped, take place on the following Monday afternoon.

CAPT. A. R. T. KIRBY (Chairman of the Hampshire Aeroplane Club), who responded, paid tribute to Col Sempill's distinguished services to aviation. In a brief history of the club, Capt. Kirby said that it had been established now for 5½ years, and that apart from one man who had disappeared last summer, they had had no serious accidents, although the club machines had flown over 600,000 miles. They were looking forward, he said, to starting at Portsmouth, and by that move they hoped to encourage younger men of the city to take up flying, particularly so, as the club had instituted a scheme whereby young lads could join for a period of their holidays at the very small fee of £1 1s.

The CHAIRMAN then proposed the health of "Our Guests." He said that the Hampshire Club were invariably lucky with their guests, and had always managed to have some of the greatest men in aviation at these annual dinners. Among those present on this occasion were: The Master of Sempill, Rear-Admiral Grant, Group Capt. Nanson, Sqd. Ldr. P. E. Maitland, the Hon. Ralph Beaumont, and several of the really keen members of the airport committee on whom should be laid the credit for the establishment of their magnificent aerodrome; these included Alderman Gilbert and Councillors Webb, Evans, Johnson and Bosworth-Wright.

COUNCILLOR W. GLEAVE (Deputy Lord Mayor of Portsmouth), in replying, said that the airport committee were as a whole anxious to make their aerodrome the best in the country, and he hoped that they would be successful.

FLT. LT. STAINFORTH, who was also brought to his legs by the Chairman, said that the ordeal of speaking was very much worse than anything he had been through at Calshot. He had made quite enough noise, he said, when flying over the Solent, and he would therefore now maintain his reputation for speed by sitting down.

MR. R. R. BRICKWOOD proposed the health of the Chairman, and remarked that the latter's church was so popular that he had to run two houses nightly on Sundays.

The CHAIRMAN himself, in reply, said that there had been a great deal of adverse criticism about the establishment of the airport, but this was now being overcome, and he congratulated the Council upon their foresight and pluck in buying the ground. His only sorrow was, he said, that there would be still further delays before the club was able to move in, as they were anxious to place Portsmouth foremost in air matters in the country.

HIGH SPEED TEACHING.—Phillips & Powis Aircraft, Ltd., of Woodley Aerodrome, Reading, have recently taught two pupils in what they think must be record time. These are Mr. R. O. Symon and Mr. W. A. Rowell. The latter started his instruction on Tuesday of last week, and passed the tests for his "A" licence on the Saturday evening. Both of the gentlemen are Cambridge men and keen motorists. To have gained their licences in such short time proves that the instruction must be good, and also that these pupils themselves must have had exceptional ability, for there is little doubt that with the average man it would not only be undesirable, but quite impossible, to make him sufficiently expert to gain his "A" licence in such a time. It should, moreover, be remembered that

A WEST INDIAN PRIVATE OWNER: Our illustrations show Mr. Michael Cipriani (right) of Trinidad, who claims to be the only private owner in the West Indies, and (left) his D.H. "Moth."

holding an "A" licence does not by any means make a man a really expert pilot, in fact, it is only the open door through which he may gain real experience. As our existing regulations are, it is only necessary to have three hours' solo experience in order to obtain this licence, and no really competent instructor will claim that this is sufficient time in which to make a good pilot. As long as pupils themselves fully realise this fact there can be no harm in them getting their "A" licence in a minimum of time.

FROM THE *ELEVATOR*.—The following letter to the Editor of the *Elevator*, the Journal of the Lancashire Aero Club, would appear to be a really feasible idea, and should be worth looking into seriously.

"I am sending you the theme of an idea which for some time has been floating about in my head, in fact I think that it originated whilst I was lying in bed at the Stockport Infirmary recovering from my little conflict with the ground. I really feel that if the idea can be made to succeed, a great deal could be done to bring before the public the fact that the Light Aeroplane Clubs are really a force to be reckoned with, and that they have done a great deal to popularise civil aviation in this country. . . . I suggest that some time during next year, preferably during May or June, since the weather usually seems more settled in these months, a fleet of aeroplanes be organised with the co-operation of all the Light Aeroplane Clubs in Great Britain for the purpose of making an aerial tour of the whole country. The tour would last for about a week and would visit each Light Aeroplane Club *en route*, and there would be no need to fly for more than about four hours each day, thus allowing plenty of time for members to rest and enjoy themselves on the holiday. Holiday without doubt it would be, and ought to be since the members taking part will be helping to pay for the "Rally" themselves and will be entitled to a little pleasure in return.

"I understand that there are at least twenty Light Aeroplane Clubs in England, Scotland and Wales, and, of course, if Ireland cared to join up, so much the better. However, this would mean that we should be able to reckon upon an average of two machines per Club, making a total of forty machines from the Clubs; then I should think that we could reckon on a further twenty machines from private owners, etc., to help to make the tour into a powerful display of aircraft. I feel certain that we could count upon sixty machines for the tour.

"Now, of course, there comes the bugbear of cost. Possibly, however, the petrol and oil companies would let us have fuel at a special rate, and this would enable the Clubs to fly their machines at a reduced cost for the tour. Since there would be two members per machine, I do not think such a tour would prove unduly costly to the members taking part in it. In any case the total cost of hotels, hire of machine, etc., etc., could be submitted to members, and I feel sure that two members per machine per Club would soon be found to take part in the tour.

"As regards accommodation, each Club would be expected to organise this for the district or town which directly concerned it, and owing to the large number taking part (I should say about 130 members would require accommodation) the hotels would be only too glad to give this at a decent price, the same, of course, would apply to meals, etc.

"No risks at all would be taken, and no close formation flying would be necessary, though some sort of formation *would be necessary* in order to ensure a certain amount of discipline and order for all concerned while in the air. I should say that the whole formation should be under the control of a picked Club instructor, or a pilot of well-known ability; the leader, in turn, to appoint flight leaders to be responsible to him for the organisation of machines which he (the flight leader) placed under him and in this way a minimum of risk would be incurred by all concerned.

"Undoubtedly there will be difficulties in the way which will have to be overcome in order to bring this scheme to a successful conclusion, but I think that each Club boasts sufficient enthusiastic members to make a success of it. However, perhaps if the idea is published in the *Elevator* some information may be obtained as to whether there is a good feeling or otherwise towards it. I am not keen upon having my name published, and therefore I sign myself

"A MEMBER (OF LANCS AERO CLUB)."

AVIATION AT SHERBURN.—At a meeting of the York County Aviation Club, held at Sherburn-in-Elmet on November 24, it was announced that Maj. Gen. Sir Llewellyn Atcherley, of Fulford Villa, York, had consented to act as President of the Club.

The Club was formed in October last to keep Sherburn Aerodrome after National Flying Services had moved to Yeadon, Leeds.

HYDROGLYDING: On December 7 Mr. Lowe Wylde carried out some tests in taking off from and alighting on water in a glider at the Welsh Harp, Hendon. Our top picture shows the glider being towed off the water by a motor boat, and below is a close-up of the glider. (FLIGHT *Photo.*)

THE LONDON AEROPLANE CLUB will be closing down for the Christmas holidays, from Wednesday, December 22, and will reopen Monday, December 28.

On Friday, December 4, the London Aeroplane Club held its annual dinner and dance at the Park Lane Hotel. Col. Shelmerdine, Director of Civil Aviation, and Mrs. Shelmerdine, Capt. and Mrs. G. de Havilland, and other well-known people were present. The dinner was quite informal. The King's health was drunk, but there were no speeches. A large number of dancing couples was present, possibly 100 couples, and when dinner was over, and the band had struck up, dancing began. The whole gathering had a very cheerful air, and dancing was kept up merrily until the small hours.

HANWORTH CLUB.—The Hon. Mrs. Victor Bruce has very kindly consented to give a talk on Sunday, December 13, at 6.30 p.m., on her flight round the world, and to illustrate this with films and slides.

As the number of persons visiting the London Air Park is constantly on the increase, it has been considered desirable, in the interest of members of the Hanworth Club, to control the entry to the Club premises. For this purpose the lodge adjoining the petrol pumps at the Motor Transport has been adapted for a lodgekeeper, who will be stationed permanently at this point.

The lodgekeeper will be held responsible for restricting entry to the club-house and surrounding grounds strictly to members of Hanworth and its associate clubs and their guests, and has received instructions to examine membership cards of all entrants until he can recognise them individually.

The Committee of the Club and the management ask members to be so good as to accept any temporary delay that may be caused, and to facilitate by every means in their power this control, which is instituted entirely in their own interests.

Duplicate membership cards will be issued on application to any members who may have lost their original cards.

On January 1 members will receive small enamel badges, as it is thought these will prove more convenient in facilitating entry than membership cards. In addition, books of vouchers for guests will be issued.

A FLYING CLUB AT CHELMSFORD.—An aerodrome is to be opened shortly at Partridge Green, Broomfield, and the Chelmsford and District Aero Club is in course of formation. Mr. H. M. Talbot-Lehmann and Mr. G. W. Higgs are chiefly concerned with the movement.

When the number of members of the Aero Club has reached about 40 a clubhouse will be erected to provide for the social side of the organisation.

A light aeroplane of the latest type and a light monoplane will be used for instructional and solo work.

It is probable that the official opening of the Club will be deferred until after Christmas. The Mayor of Chelmsford, Councillor Hugh Wright, has agreed to perform the official opening.

AN AERODROME FOR SOUTHEND.—The Rochford Racecourse has been acquired by the Southend Flying Club as an aerodrome. The club recently purchased an Avro machine, and now one of the members has become the owner of an Avro baby two-seater.

AVIATION AT BROOKLANDS.—All flying at Brooklands, in common with most other aerodromes, came to a standstill owing to the thick fog for five days last week, and heavy rain and wind following the fog also made instruction impossible. The time was spent in constructing a scale model of the track and aerodrome in order to demonstrate various methods of approaching to land over the many obstructions surrounding the aerodrome, as in certain wind directions at Brooklands it has been noticed with pain that pupils have been making more than one shot at "arriving."

A new pupil is Mr. Kristian Haldorsen, of Norway, who intends, after gaining his "A" licence, to fly a seaplane back to Norway.

It has been decided to close the School during the Christmas holidays. There will be no flying from Wednesday evening, December 23, until Thursday morning, December 31.

Airport News

CROYDON

THE early part of the week saw a dislocation in the services owing to fog, and these conditions prevailed for about three days, after which came gales and storms, so taking the week round the weather has been far from choice. It has apparently been just as bad for shipping, so no one can accuse the air services of being unable to carry on as against other forms of transport, as all have been affected alike. All the operating companies are now feeling the usual winter draught in the way of both passengers and freight. This is the period of the year, of course, when we expect these things, and everybody tries to keep up a smiling face, hoping that the springtime services will soon commence and that the passenger and freight traffic will be even higher next year than this.

On Tuesday preparations were made for the reception of Miss Peggy Salaman. A special platform was erected, and half of Fleet Street had put in an appearance. At about midday, however, the reception in so far as Croydon was concerned was cancelled, the platform was pulled down and Fleet Street went home. One was glad to hear in Miss Salaman's broadcast that she gave all the credit to her partner, Mr. Gordon Store. Undoubtedly the Press, in search of their usual sensationalism, were responsible for a lot of the reports that appeared.

Xmas, Boxing and New Year's days look like being decidedly quiet. All companies have cancelled their services on all these days, with the exception of Imperial Airways, who are running normal services except on Xmas Day, when there is quite a possibility that the Empire mail will arrive. If this is to be the case I can foresee some violent weeping and gnashing of teeth in various directions.

The joyriding companies, needless to say, are not praying for a real old-fashioned Xmas; they sincerely hope that the weather will be after the style of June, for this holiday means quite big business for them if the weather keeps good.

A French Morane monoplane arrived on Saturday *en route* for Radlett, where it is proceeding to be fitted with slots. This machine looks a much more substantial job than some of the previous types. The usual Morane design is followed, and there are two open cockpits. The undercarriage looks as if it will stand up to endless bad landings.

The traffic figures for the week were:—Passengers, 381; freight, 41 tons.

P. B.

Air Trips over London

GEORGE LUNN'S TOURS (136, Wigmore Street, W.1), by arrangement with Imperial Airways, are inaugurating a series of short flights over London in the giant Handley Page type 42 air liners. The charges are fixed to enable every class to make their first experimental flight in the air and to realise the comfort and security which British aircraft offer. The first flight will leave on Saturday, December 12. Parties of 20 or 38 can be accepted for daily flights at any time required.

Air Transport

Commercial Aviation in Peru

IN the Report of the Department of Overseas Trade on the *Economic Conditions* in Peru, the following is given concerning commercial aviation. The progress of commercial aviation in Peru, since its inception on a business footing but a few years ago, has far exceeded all expectations. Two entities are now actively engaged in giving effect to this, namely, the Compañia de Aviación Faucett, S.A., a Peruvian company, the Pan-American Grace Airways, Incorporated (Panagra), a United States concern, which receives a subsidy of $1.80 per mile per flight. The Compañia Aero Postal extended its service from France to Santiago and up to Lima, during the first months of 1931, but this service has now been suspended. The itinerary followed by the two commercial undertakings is as follows:—From Lima, northwards in direct connection with New York: Trujillo, Pimentel, Chiclayo, Piura, Paita, Talara and Tumbes; and from Lima southwards, in direct connection with Valparaiso, Buenos Aires and Montevideo: Pisco, Ica, Camana, Mollendo, Arequipa and Tacna. The routes served by the Peruvian Government service are: (*a*) San Ramon, Masisea, Contamana and Iquitos; (*b*) Iquitos, Yurimaguas and Moyobamba; (*c*) Iquitos, Chimbote and Huailas; (*d*) Arequipa, Puno, Cuzco and Madre de Dios, and (*e*) Pacasmayo, Cajamarca, Celendin, Chachapoyas and Moyobamba.

The official statistics for the year 1930 furnish the following eminently satisfactory results during that period:—Passengers transported, 5,522; miles flown, 564,605; number of flights, 1,138; number of accidents, nil.

That the above activity has proceeded without a single accident of importance is due, it is stated, to the excellent management of the undertakings and to the favourable atmospheric conditions, particularly throughout the Peruvian coastal zone.

Both the Faucett and Panagra Companies run two weekly services, north and south from Lima, with absolute punctuality, apart from special trips, and the number of passengers carried, while comparatively stationary at 500 per month during 1930 is now showing signs of increasing. When the time saved is taken into consideration, this would appear to be nothing more than a natural consequence; for instance, a trip from Lima to Arequipa, by train and steamer, cannot be made in less than 44 hours, whereas by air it is done in 5 hours; and in the same way from Lima to Paita, by train and steamer, 48 hours are necessary, but by air the voyage is made in 6½ hours.

The machines at present in use by the two commercial entities named are as follow:—

Faucett Company:—3 Stinson Detroiter 8-seater cabin planes, and 1 Stinson Detroiter 6-seater cabin plane.

Panagra:—3 Ford trimotors and 2 Fairchilds.

The Peruvian Government established, in the year 1929, a special office to supervise all commercial and civil aviation known as the Dirección de Aviación Commercial y Civil, which is controlled by the Inspección General de Aeronáutica.

Landing grounds are now available in most of the principal cities of the Republic and their number is being added to from time to time.

The same route is followed by all machines so that in the event of a machine not being able to reach its destination it would be speedily found. To avoid discomfort to passengers, as far as possible in these circumstances, all machines are obliged to carry a hermetically-sealed compartment containing a supply of medicines, food and water sufficient to provide the full complement of passengers with emergency medical attention and the actual necessities of life from two to three days.

Australian Xmas Air Mail

DESPITE two minor accidents, Air Com. Kingsford Smith, who left Sydney on November 30 in the *Southern Star* to pick up the mails from the *Southern Sun*, which crashed at Alor Star on November 26, is making good progress in his dash to England. His first mishap occurred when landing at Darwin on December 2, the machine striking a telegraph post and being slightly damaged. Repairs were immediately effected, and next day Kingsford Smith was able to proceed to Koepang and Bali. He reached Batavia and Singapore on December 4, and continued on to Alor Star, where he picked up the stranded mails. Bangkok was reached on December 6 (shortly after the accident to the Dutch mail plane, referred to below), and Rangoon the same evening. Calcutta was reached on December 7, and Karachi the following night, Kingsford Smith proceeding in the early hours of December 9.

Dutch Air Mail Crashes

THE homeward-bound Dutch mail Fokker aeroplane crashed when taking off from the Bangkok aerodrome on December 6. The two pilots, the mechanic and two passengers were killed, and the other two passengers were injured. One of the injured was Col. Brinsmead, Controller of Civil Aviation in Australia, who has a fracture of the skull and some ribs broken. His condition is serious. Shortly before he had been slightly injured in the crash of the Australian National Services' Avro 10, *Southern Sun*, which was bringing Christmas mails to England. Col. Brinsmead had evidently flown on from Alot Star to Bangkok by the Dutch air service. The cause of the crash is reported to be that a hatch had been built in one of the wings to enable the pilot to escape in case of an accident. This had been opened to ventilate the cockpit and had not been closed when the machine attempted to take off, with the result that it would not rise.

Manx Air Service

THE projected passenger air service between the Isle of Man and Liverpool, reference to which has previously been made in FLIGHT, has been brought a step nearer by the purchase of a Supermarine "Sea Eagle" (Napier "Lion") amphibian machine for the operation of the service in its initial stages. The efforts to inaugurate the proposed air service next summer are being made by a Manx concern, headed by a former pilot of the R.A.F., Capt. D. Campbell Shaw. He was also personal pilot to the late Sir Sefton Brancker. Negotiations are also proceeding between the promoters of the service and Douglas Corporation regarding landing and taking off facilities in Douglas Bay.

Blériot building a 20-Tonner

ACCORDING to our excellent French contemporary *Les Ailes*, the Blériot firm at Suresnes has under construction a very large monoplane flying-boat of all-metal construction, which is intended for the air mail service to South America, and which will, it is expected, be ready for flight in about a year's time. The new machine, known as the type 5190, will be equipped with four Hispano-Suiza engines of 600 h.p. each, two of which are arranged outboard in the leading edge of the thick monoplane wing, while the other two, placed centrally above the wing, are in tandem, one driving a pusher airscrew. The new machine is a single-hull flying-boat with outboard wing floats for stability. It will have a wing span of 141 ft., a wing area of 2,730 sq. ft., and a tare weight of 12 tons (metric), which is calculated to give it sufficient range for the South Atlantic crossing while carrying a pay load of 1 ton. The range has been calculated for a constant head-wind of 30 m.p.h. As an alternative to an all-mails pay load, accommodation can be provided for 20 passengers.

Ford A.T. 5.D for N.A.T.

THE American Ford Motor Co. have recently supplied an A.T. 5.D three-engined passenger machine to N.A.T. Air Transport. This machine will be operated on the New York-Chicago route, and brings the total number of Ford aircraft in use by N.A.T. up to 22. Mail compartments have been installed in the wings in the same manner as the Pullman Ford which was described in FLIGHT for October 16.

Airisms from the Four Winds

Viceroy of India's 'Plane

THE AVRO 10 monoplane, which has been flown from England by Mr. Vintcent, for the personal use of the Viceroy, arrived in Delhi on December 6. After being overhauled the machine will be flown to Calcutta, where the Viceroy is staying. On December 4 the Viceroy and Lady Willingdon flew from Delhi to Calcutta in a Desoutter monoplane, piloted by Capt. Riley. They were accompanied by two other machines, a "Puss Moth," carrying two members of the Viceroy's staff, and an R.A.F. "Wapiti," which acted as escort.

Graf Zeppelin's Well-Earned Rest

WHILE we are breaking up our £450,000 airship R.100, Germany's airship, *Graf Zeppelin*, has retired to her hangar at Friedrichshafen for the winter, to have a well-earned rest, and at the same time a thorough overhaul in readiness for next year's activities after the spring. During 1931 the *Graf Zeppelin* made 73 trips and flew 73,600 miles, carrying a total of 2,056 passengers; the total time spent in the air was 1,201 hours. The airship's voyages included three trips to South America and back, a trip to the Arctic, and a special flight to England. Her total number of journeys has now been brought to 232 in her three years' existence, while she has covered a total distance of 218,015 miles and been in the air for 3,588 hours. In the three years the total number of passengers was 8,778. If the crew is included in the figures the Zeppelin has carried 15,472 people on her 232 voyages, an average of just under 70 per trip. Meanwhile work is progressing steadily on the construction of the *L.Z. 129*, and it is expected that this vessel will be completed by the end of next year. The *L.Z. 129* is to be equipped with crude-oil motors built by the Maybach Company. According to the *Daily Telegraph* correspondent, Dr. Eckener, commander of the *Graf Zeppelin*, arrived in Sheffield on December 7, on a private visit. Before he returns to Germany he will have an interview with the Marquis of Londonderry, Secretary for Air, and perhaps with the Prime Minister. It is believed that his visit has some relation to the possibilities of a Transatlantic mail service by airship, and it is stated that Dr. Eckener is anxious also to purchase some of the remains of R.100.

Flying Below Sea Level

IT may be of interest to note that the Imperial Airways' Short "Kent" flying-boats, which are fitted with moderately supercharged Bristol "Jupiter" engines, are at present landing at Tiberias, on the Sea of Galilee, some 700 ft. below sea level—probably the lowest level at which any aeroplane is operated. It is worthy of mention, too, from the fact that the engines in use are supercharged and normally intended to give their best performance considerably above sea level, whilst in this instance they are also required to give satisfactory service much below normal ground level.

French Transatlantic Flying-Boats

M. DUMESNIL, the French Air Minister, speaking in a debate in the Chamber in Paris on the national equipment scheme, stated that plans for the construction of big flying-boats to be used on Transatlantic services to North and South America were under consideration. Credits, he said, would be asked for the construction of three machines, primarily for a service to South America, and later for one to North America.

This is Mr. C. A. Butler, who recently made a record flight from England to Australia in a Comper "Swift" (Pobjoy engine) and—

Russia's Aerodromes

ACCORDING to the *Daily Telegraph* Russia is building aerodromes at the rate of one a week. So far this year 50 new aerodromes have been completed. Over 100 radio stations have been built to transmit meteorological data.

A Regrettable Accident

ON September 19 Mr. Leroy Manning, together with Mr. Lycirgus Garriott, mechanic, were killed when a Ford three-engined high-speed day bomber crashed on its way back to Detroit after its army acceptance tests. No authenticated details are at present available, but it is rumoured that an explosion caused one of the wings to break and thus brought about the fatal crash.

British Aviation Rights in Ireland

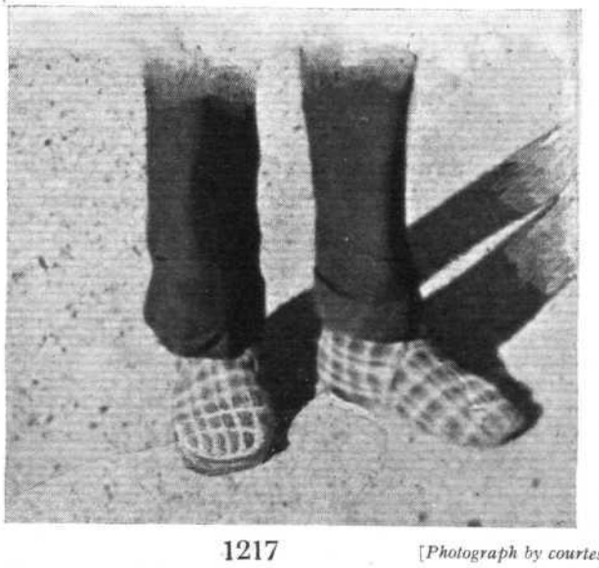
OUR Irish Correspondent writes us as follows:—"Readers interested in politics may have been slightly puzzled over the reference made by Mr. Winston Churchill, in a recent debate on the second reading of the Statute of Westminster [which has been promoted to give the Dominions sovereign status] to the power that would be given to the Irish Free State to repudiate British rights in respect of harbours, aviation and oil storage. The Free State as a Dominion has control over its own flying, and the remark has aroused some comment as to what are the British rights with regard to aviation. Under the Act constituting the Free State (passed in 1921) certain facilities were granted to Great Britain in respect of harbours and dockyards, and these include the defence of such ports. The aviation facilities are the provision of suitable sites for the efficient defence of these harbours from the air and have no relation whatever to ordinary civil or military aviation in the Free State, which are under the control of the Ministers for Industry and Defence, respectively."

More About Dr. Eckener's Visit

SINCE writing about Dr. Eckener's visit to England (see previous column) a further report has come to hand which states that he visited Howden and Cardington—the birthplace and slaughterhouse of R.100—on December 8. It was explained that Dr. Eckener had offered to place his knowledge and experience at the service of the British Government, with the view to an arrangement being made for the taking over of the airship sheds at Cardington and Howden, for the purpose of building Transatlantic airships.

U.S. Speed Ace Killed

IN a recent attempt to beat the world's speed record for a land machine, the American pilot, Lowell R. Bayles, claimed an average of 284.72 m.p.h. over 3 km. His speed, however, was subsequently given as 281.9 m.p.h., and his claim has been disallowed. In making a second attempt on December 5 he crashed and was killed.



—a pair of carpet slippers!

[*Photograph by courtesy of Vacuum Oil Co., Ltd.*

FOKKERS FOR THE ROYAL DUTCH AIR FORCE: Eight Fokker D.XVI biplanes, fitted with Armstrong-Siddeley supercharged "Jaguar" engines, recently delivered to the Royal Dutch Air Force.

German Airwoman's Flight to Far East

FRAULEIN ELLI BEINHORN, the German airwoman who made a solo flight to West Africa in January, left Berlin on December 4 on a flight to India and the Far East, landing later at Budapest.

"Control Beyond the Stall"

DR. G. V. LACHMANN will read his paper on "Control beyond the Stall" before the Royal Aeronautical Society on Thursday, December 17, 1931, at 6.30 p.m., in the Lecture Hall of the Royal Society of Arts, 18, John Street, Adelphi, W.C.2. During the last two years Dr. Lachmann and his associates have been carrying out research work on this very important problem. In his paper, which will be very fully illustrated, Dr. Lachmann presents the results of this research, and reviews the developments which have taken place in lateral stability and control beyond the stall, and the less explored problems of longitudinal control beyond the stall. Suggestions are made as to the way existing technique can be applied to produce a fully controllable spin-proof aeroplane capable of being landed in restricted areas. To make an aeroplane spin-proof is much more important than to accept the situation that spinning is an inherent characteristic of the aeroplane and the best must be made of it.

Correspondence

The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.

"FLYING BOATS IN EMPIRE DEFENCE"

[2783] You have been good enough to give a certain prominence to a lecture I recently gave at the Royal United Services Institution on "Flying Boats in Empire Defence," so that perhaps you will allow me to correct one or two wrong impressions, which I submit are conveyed by your comment in the issue of FLIGHT dated November 27.

It is contended that I seemed to give my case away when I said that it was useful for a flying boat on patrol to come down on the sea and wait. What I actually said was: "The function of the flying boat . . . is to remain in the air and only use the water as an aerodrome; *in fair weather* the open sea can be used when on patrol; this is an asset, as sometimes a waiting game can be played, and the flying boat is not forced to remain in the air continuously." I did not at any time imply that the present flying boat could or would do this in a rough open sea, which seems to me the point of your criticism; if the quotation had been more accurately reproduced, this, I think, would have been clear, and in conformance with my contention that the ocean-going flying boat is not yet within sight.

In a later paragraph you say: "If this link is to be dependent on the permission of foreign nations, then we must have a supply of boats which are able to fly non-stop from England to Gibraltar and on from Gibraltar to Malta. Wing Com. Bayley attempted to discount this argument, firstly, by mentioning that one R.A.F. boat (*i.e.*, the Saro A.7) has already flown non-stop from Gibraltar to England, and, secondly, by asking why a belligerent flying boat should not be allowed to refuel at a neutral port, as that concession was allowed to belligerent warships by the international rules of war." Again, if the references had been correctly given, it should be plain that nothing was further from my intention than to deny how essential it is for us to have flying boats capable of the distances mentioned. May I point out that I emphasised the fact that we are aiming in new types at a range of 1,500 sea miles when required, together with a high degree of seaworthiness; that we are already reaching the stage where a flying boat can fly from the United Kingdom to the East without touching foreign territory? I do not think my subsequent remarks as regards refuelling at neutral ports should, in fairness, have been directly coupled with these points. I was then talking about a totally different subject—that of belligerent rights—and endeavouring to point out that the flying boat is not accorded the same latitude as that allowed to a ship of war. Whatever the range of flying boats—or ships for that matter—it should be obvious that the greater the number of potential refuelling points, the easier the journey. Surely there is no attempt here to discount the argument of the necessity of having flying boats of range sufficient to reinforce within the Empire without touching foreign territory.

It is impossible to deny that seaworthiness in flying boats is essential; in my lecture I said that "a high degree of seaworthiness vastly increases strategical mobility and operational value, but seaworthiness is closely linked with performance in the air, and this we must have." I submit that this is the fairest way of putting it; the result is, and inevitably will be, a compromise, but then every aircraft is.

If, however, in my lecture the case for performance was over-stated, as is implied, it is somewhat surprising that no one in the audience got up afterwards and said so.

I should add that neither my lecture nor this letter necessarily represents the official Air Staff view.

R. M BAYLEY.
Wing Commander.

Air Ministry, London, W.C.2.
December 4, 1931.

The Industry

Christmas Presents which will Satisfy Everybody are described in this Section

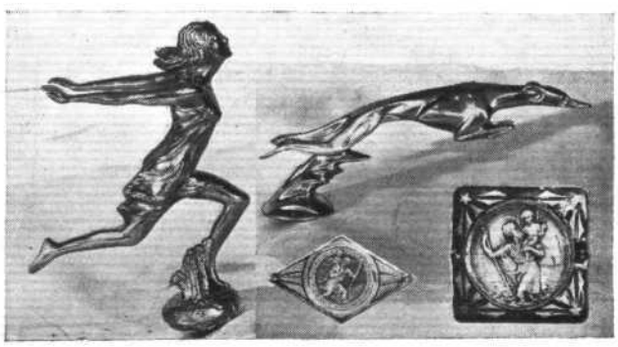
PERSONAL PRESENTS

AIRMEN, like other people, also appreciate personal presents. Few more acceptable such articles are to be found than those offered by the Goldsmiths & Silversmiths Co., 112, Regent Street, London, W.1. Silver-mounted calendars, silver cigarette boxes, cigarette cases and travelling clocks are just such things as any man likes to possess, and those to be found in these showrooms are undoubtedly of the finest quality, while being very reasonable in price.

A desk Calendar from the Goldsmiths & Silversmiths Co.

INSTRUMENTS AND EXTRAS

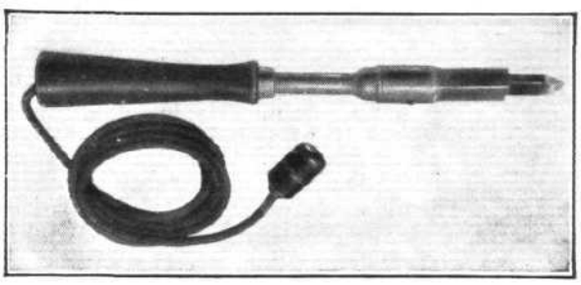
ACCESSORIES invariably make excellent Christmas presents, particularly when they are of the type which is really useful. Smith's Aircraft Instruments, of 185, Great Portland Street, London, W.1, are one of the leading suppliers and manufacturers, not only of every type of aircraft instrument, but also of a very varied selection of mascots and similar accessories suitable for the motor-cars of pilots as well as for their aircraft. The name of Smith's generally brings into the mind compasses, bearing plates, course and wind calculators, K.L.G. plugs, and other such standard fitments on aircraft. When looking for Christmas presents, one usually likes to give something a little more out of the ordinary, and those who wish to do so will have no difficulty in satisfying themselves at this house. There is, for example, the "Wootton Junior" pocket lantern, which is a very light-weight type of flashlamp lit by an unspillable accumulator, with the reflector assembled so that it may be focused to give either a floodlight or a concentrated beam. Then there is the "Magnetic bearing and distance indicator," which gives 1,600 magnetic bearings and distances between aerodromes in Great Britain simply by turning a knob. A Time-of-Flight clock, with seconds and minutes chronograph, makes a very acceptable present, and simplifies the work of the pilot in keeping track of his journeys. The "Addison-Luard" course and wind calculator is probably the best and simplest instrument for the purpose; with it may rapidly be solved all trigonometrical problems which ordinarily occur in aerial navigation; in its latest form the Appleyard time and distance scale has been included. As most pilots run a motor-car, which is very often of the sports variety, radiator mascots denoting speed are usually acceptable. Among many others, the "Swift Figure" and the "Greyhound" are listed, while for those who like to have an effigy of St. Christopher, the guardian of all travellers, with them there are plaques in many and varied forms.



Smith's mascots are very graceful. Here on the left you see the "Swift figure" and on the right the "Greyhound." Below are two examples of "St. Christopher" plaques.

FOR THOSE WHO SOLDER

THE MAJORITY of people who are actively engaged in aviation are sure to be interested in motor-cars or wireless, and for such as these a soldering iron is always handy. Many have workshops of their own, while others are actually working in aircraft workshops; for either of these an electrically operated soldering iron is both a boon and a blessing, for it is kept at a constant temperature and simplifies the operation of soldering immeasurably. Brown Bros., Ltd., of Great Eastern Street, London, E.C.2, market the "Solon" soldering iron for any voltage required. It is of particularly robust construction, having a heavy copper pad, which surrounds a steel-cased heating element. The main electrical connections are also covered with a rust-proofed steel case, while the handle is of adequate dimensions. With each "Solon" iron a supply of "resin-cored" solder is supplied. This is in the form of an alloy tube filled with resin, which melts out when the solder is heated and acts as a direct flux, thus greatly simplifying soldering.



The "Solon" electric soldering iron which can be obtained from Brown Bros. of Gt. Eastern St., E.C.2. The constant heat of this type of iron makes soldering very easy.

A useful type of fur-lined flying helmet to be had from D. Lewis of Gt. Portland St., London, W.1.

FLYING CLOTHING

SUITABLE clothing when flying is one of the chief factors which go towards making a flight enjoyable, particularly in open machines. Clothing of all types can be obtained from D. Lewis, Ltd., 124, Great Portland Street, London, W.1, and their range of helmets, flying suits, goggles, boots, jackets and coats provide a range from which it is easy to choose suitable presents.

Selfridge's offer a wide range, such as helmets, goggles, maps and compasses, in fact everything the flying man can want. It is not difficult to find a suitable Christmas present for your pilot friend if you go to their Aviation Department.

FOR ALL ACCESSORIES

SELFRIDGE & CO., LTD., have an extensive Aviation Department, which is already very well known. They are in a position to supply every kind of accessory, including Irvin Air Chutes, flying helmets, ear-phones, goggles, flying clothing, flying boots, aviation books, instruments, compasses, turn indicators, deviators, etc., etc. Furthermore, they can supply maps of all kinds, and they are in a position to quote insurance rates which they claim are at least as good as those obtainable elsewhere. Their Aviation Manager is a well-known and expert pilot, and therefore able to give his customers the best of attention and advice. One of their most interesting articles is their new flying helmet. This has been made in four panels, running from front to back, thereby ensuring a close and comfortable fit. The strap has had particular attention paid to it, so that, instead of pulling the helmet apart in the neighbourhood of the ear-phones, it causes these to sit even more snugly over the ears and obviates all cause of bad hearing. The buckle, which is very easy to work, is particularly large and of the adjustable kind. Sorbo pads are fitted inside the telephones, preventing these hurting the ears in any way. The helmet can be supplied in black or brown leather and, if required, with a special sun-proof lining.

FLYING MODELS

REALLY good flying models form ideal gifts for Christmas—not necessarily for young people only, as there are now many grown-ups who take an active interest in the construction and flying of model aeroplanes. The name of A. E. Jones, Ltd., of 97, New Oxford Street, London, W.C.2, is well known in the miniature aviation world, and we need hardly mention that it is possible to obtain from this firm not only all the materials and parts required for the construction of model aircraft, but also a range of really excellent flying models, ready for the air. We show three of these in the accompanying illustration, from which it may be seen that natural appearance is also one of their qualifications. All are fuselage monoplanes, with the following characteristics:—The "Falcon"—a well-known flyer—has a span of 42 in., a length of 27 in., and is fitted with triple gear. It weighs 8 oz., and has a duration of 60-85 sec. hand launched, or 45-75 sec. r.o.g. The "Sky Rover" is 46-in. span, 34½ in. long, and weighs 10 oz.; it has a performance of 75 sec. The "Kinglet" is 36-in. span and weighs 5½ oz.; it has a performance of 50 sec.; all materials for constructing this model can also be supplied. A very comprehensive illustrated folder concerning models and accessories may be obtained on application to A. E. Jones, Ltd., on mention of FLIGHT.

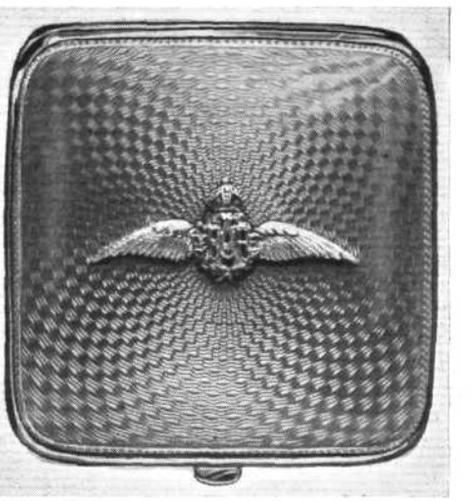
Above are three of the A. E. Jones models. At the top is the "Kinglet," in the middle the "Sky-Rover" and at the bottom the "Falcon."

ALMOST A NECESSITY

GOGGLES which are well fitting are little short of a necessity for every pilot of an open machine, and such a pair must, therefore, be an admirable Christmas gift for those who do not possess them. E. B. Meyrowitz, Ltd., of 1A, Old Bond Street, London, W., are the makers of one of the best-known types of goggles on the market. Their new Luxor goggle is now sold in a leather case, together with wide and flat sorbo-protected eye-pieces, which fit close to the face and effectually prevent leakage of wind between the goggles and the cheek bones, thus giving entire comfort. A de-luxe model is sold with curved, hand-ground non-shatterable Acetex lenses, and the price of this model has just been reduced. Incidentally, it was this type which was worn by the English pilots in the Schneider Trophy contests of 1929 and 1931.

PRESENTS FOR CHRISTMAS

CHRISTMAS is approaching, and the women folk of all pilots should visit such a shop as Gieves, Ltd., of Old Bond Street, which, being a man's shop, provides a very varied assortment of gifts suitable for men. Besides the usual range of clothing, such as dressing gowns, pyjamas, ties and silk handkerchiefs, there is also a wide range of jewellery having about it an aeronautical flavour, a fine specimen of which is the cigarette case illustrated below.

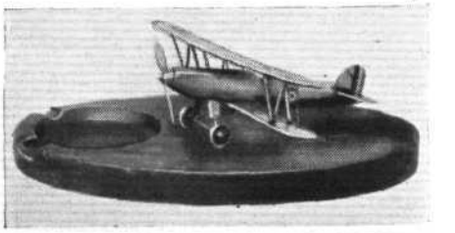


Cigarette cases with monograms are a feature of Gieves' gifts.

MASCOTS

A. E. LEJEUNE, of 132, Great Portland Street, are the makers of mascots for all purposes. Some are in the form of motor mascots to be fitted to the radiator cap, and in this case scale model aeroplanes are sold which are correct in every detail. Almost all well-known types of aeroplanes can be supplied, and in every case these models are beautifully finished, being cast in solid bronze, enamelled if required, but otherwise finished in bright or antique silver. Some models are mounted on ash-trays and paper-weights, making attractive additions to any man's desk.

Square and oblong ashtrays can also be supplied if required. Cuff links having the effigy of St. Christopher on them in enamel, are popular for travellers.



An attractive ash tray made by Lejeune. The model is true to scale, and is mounted on a very handsome green Onyx base which forms the ashtray and cigar rest.

A leather jacket from Austin Reed's—suitable for flying or golf.

A HELPFUL CHRISTMAS HINT

AN AIRMAN, like any other citizen, has to wear normal clothes, and he cannot do better than visit "The Man's Shop," as Austin Reed's, of Regent Street, is called. There an exceptionally fine selection of everything a man needs, at very reasonable prices, is to be seen, and those who would have their gifts of real personal value cannot fail to find something suitable. Leather jackets, pullovers, gloves, or, in fact, any article of clothing needed by a man may be obtained in infinite variety.

A PRACTICAL GIFT

RELATIONS who are at a loss as to what they may give their young nephew or niece who is interested in flying might do well to consider presenting them with a cheque which will cover a course of flying at any one of the well-known flying clubs or schools. Full details of all such places are to be found in our advertisement pages. Few things are more acceptable for the boy on leaving school than to be assured that he can obtain his "A" pilot's licence without having to find the money himself. In a similar way, those whose interests turn more to the engineering side of aviation can be presented with the fees for a course at one of the several schools and colleges which now provide facilities for training ground engineers.

FLYING KIT

A FIRM which is now making a particular display of flying helmets, earphones and aviators' clothing in general is A. W. Gamage, Ltd., High Holborn, London, W.C.1.

BOOKS

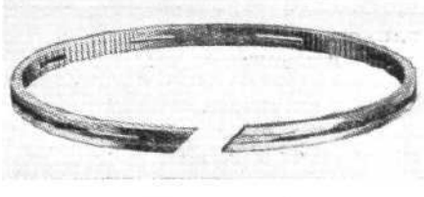
BOOKS can never fail to please, whether they are given to the younger generation, who, if they are interested in aircraft, are always ready to read aeronautical publications avidly, or to the older pilot who wishes to add to his knowledge of the subject. On page xxxi will be found just a few of the exceptionally fine selection, any of which may be obtained from FLIGHT. Here are listed both technical books and also many novels having flying as their main theme, while for the younger generation there is a series of exciting volumes which make clean and wholesome reading.

WHY NOT PHOTOGRAPHS?

EVERYONE likes to have a collection of photographs of various types of aircraft, and such make admirable and seasonable gifts. Whether it is desired to send large prints or merely a series of postcards, these may be obtained from FLIGHT, as we hold what is probably the most unique and comprehensive library of aviation photographs in the world.

FOR ENGINE EFFICIENCY

PISTON rings are a small but vital part, and on them depends, to a very large extent, the efficient running of the engine. For rings to be entirely satisfactory, however, it is essential that they should be absolutely flat, and it is this flatness which the Light Production Co., Ltd., of 66, Rochester Row, London, S.W.1, claim that their rings have. "Flatness" is, in fact, the watchword of their factory, and no stone has been left unturned to lead to perfection of this quality. Many special machines have been designed for this purpose, and there can be little doubt that those used in the manufacture of "Cygnet" rings are the best procurable. Rings for all purposes are made in the factory at Slough, including the slotted type of scraper ring, which is probably one of the most efficient scraper rings produced. A piston ring may seem a small and easily manufactured article to the uninitiated, but they would have this idea quickly changed were they to see the manufacture of a piston ring from beginning to end. Not only is there a large number of operations, but every one of these operations is checked by an inspection staff, so that one can truthfully say that there is as much inspection time spent on the production of a piston ring as there is manufacturing time. Such an inspection, of course, ensures that every ring shall be up to specification, and therefore give entire satisfaction throughout its life. "Cygnet" rings are made from centrifugally cast iron cylinders, such an iron having a very close grain, ensuring homogeneity of the material, freedom from flaws, suitable elasticity, and wearing properties which are not found in any other type of cast iron. Another product from this factory is the "Aerolite" compensating piston. This is an aluminium piston so designed that it allows for the difference in the coefficient expansion of aluminium pistons and the cast iron of which the cylinder block is made. The patents embodied in this unique piston maintain a fine clearance which prevents piston slap when cold and at the same time makes due allowance for difference of expansion, thus preventing seizure under running conditions. Among the chief advantages is the fact that parallel operation is maintained, thus ensuring that the rings are held dead square to the cylinder, while helping to maintain initial compression and reduce oil consumption. Lateral motion is also obviated at any temperature and under any conditions, resulting in silent operation with reduction of wear in the cylinder bore and ring grooves.



The slotted scraper ring made by the L. P. Co. It is exceptionally efficient.

A NEW AVIATION COMPANY

THE LONDON & PROVINCIAL Aviation Co., whose Head Offices are at 10, Philpot Lane, London, E.C.3, are shortly opening up a showroom at Barnet. Mr. S. J. Gilbert is the power behind this company, and he is going out of his way to cater for people in the aircraft trade, by supplying many little things which they ordinarily find difficult to obtain. For example, he markets an excellent safety glass goggle at 7s. 6d. retail, while he has already taken on several large contracts for the supply of "Motrol" lubricating oil. Anyone interested in the purchase of aircraft or accessories, insurance and suchlike, should write to Mr. Gilbert, mentioning FLIGHT.

FOR ENGINE JOINTING

LIHERMETICOLL Liquid Jointing is used in large quantities in the aircraft industry. It is produced in this country by the Patent Motor Products Co., Ltd., of 20, Store Street, London, W.C.1, and it is recommended for its imperviousness to oils, heat and water on engine work. It is simply applied with a brush to the surfaces of the parts to be assembled, and is a very quick method of jointing. It can easily be wiped away with a rag and methylated spirits when a joint is being dismantled.

Book Reviews

R.N.A.S Fighters

Naval Eight. A History of No. 8 Squadron, R.N.A.S.—afterwards No. 208 Squadron, R.A.F.—from its formation in 1916 until the Armistice in 1918 (The Signal Press, Ltd.). Price 11s., post free, from FLIGHT *Office.*

EVERY addition to the number of histories of squadrons in the R.A.F. is welcome ; we cannot have too many of them in our library. To future generations they will be priceless treasures. They tell how the air arm was born in war—" suckled on gunpowder and weaned on glory," as Sgt. Merrill, of the Yeoman of the Guard, has it. What would members of some Army regiments not give for accounts of the first campaigns in which the regiment fought written by men who were actually there? The R.A.F. is fortunate that it had its beginnings in an age when men were able to write and when publication was not a difficult matter.

Far too little has hitherto been written about the R.N.A.S. It was a much smaller service in point of numbers than the R.F.C., and its ways and its doings are still somewhat of a closed book to the majority of Air Force officers and to the general public. During the war it played rather a lone hand, for we believe that the R.N.A.S. was more devoted to the Royal Navy than the Navy was to the R.N.A.S. There were very few carriers during the war, on which men of the two arms of the service could get to know each other personally. The flying-boat units cannot have had much personal intercourse with the men on the ships, while the float-planes of those days were rather apt to break up after a forced landing, and so to cause trouble to surface craft which had to attempt rescue. At any rate, that is what the non-naval man supposes to have been the case. So, people learn little about the R.N.A.S. except when it tells its own story. Fortunately, the service contained not a few men who could write as well as fight, and some of the R.N.A.S. books are as good reading as any war literature.

Among the best of these books must be reckoned *Naval Eight.* It is a composite work, with chapters written by several different members of the squadron. Group Capt. G. R. Bromet, D.S.O., O.B.E., now on the Staff of the Coastal Area, was the first C.O. of the squadron, and he has written the early history. His successor, Sqd. Com. (afterwards Major) Christopher Draper, D.S.C., carries on the tale. Then other members contribute chapters, which are really articles, on the duties and experiences of the flight commander, the flying officer, the armament officer, and the " lower deck." It would be hard to say which of these chapters is the most interesting. All are well written, and each one contributes substantially to an understanding of the squadron and its history. The book, we are privately informed by Group Capt. Bromet, is " an amateur effort entirely, and has been produced primarily for the benefit of the old members of the Squadron." That may be so, but the writing and publication of this book has done a real service to the reading public, for which gratitude is due to the various writers who have contributed to the book.

In the second volume of the official history, " The War in the Air," Mr. H. A. Jones writes of this squadron:—" The squadron went up to Vert Galand aerodrome to take up its new duties at the end of October (1916). There it was soon to prove that the ' Pup ' was equal in performance to the best of the new German fighters. . . . The squadron had a remarkable record over the Somme area ; down to the end of December, 1916, it destroyed 24 enemy aeroplanes, of which 20 fell to the ' Pups ' and four to the Nieuport fighters. Its own loss was two pilots killed."

Naval Eight Squadron was, in fact, formed from various R.N.A.S. units as a fighter squadron, to be lent to General Trenchard as a reinforcement for the R.F.C. during the Somme battles. Though each member of the squadron had had previous experience of duties for the Navy, the squadron as a unit was employed throughout its whole career as a fighter squadron of the Army. For general administrative purposes it remained under the control of the Admiralty, and throughout it maintained its naval spirit and its naval uniform. It had this pull over the Army squadrons, that the Admiralty throughout a great part of the war could command a better supply of aeroplanes. In 1917, for example, the German fighters (" Albatros " and Halberstadt) were somewhat in the ascendant when the Sopwith Triplanes of the naval units appeared on the Western Front and speedily proved their superiority. The writers in this book hold that the R.N.A.S. had better mechanics than the R.F.C. could generally command—a claim which is likely to be disputed by many an old R.F.C. man. At any rate, this book breathes a spirit of mutual affection between " upper " and " lower " decks, which is quite admirable and accounts for the splendid team work of the squadron.

One very commendable feature of this book is the excellent series of portraits of officers who belonged to the squadron. We recognise the countenances of more than one old friend (if we may so describe them) who has since those days become famous, *e.g.*, Flt. Com. B. L. Huskisson, Flt. Lt. S. J. Goble, and Sqd. Com. C. Draper. It is pleasant to reflect that some of the original members of the squadron have done well since the war and have risen to high rank. We only wish that the same could be said of all the pilots who survived ; but sometimes peace comes harder on a good man than does the turmoil of war.

The squadron went into the Somme battles with one flight of " Pups," one of Nieuports, and one of Sopwith " 1½-strutters." Before long the two latter types were replaced by " Pups," which had proved a great success. In 1917 the squadron was re-equipped with Sopwith Triplanes for the Arras battles ; and later it received " Camels." Each of these types was in its day superior to the best fighters that the Germans could muster, and that in no small measure accounts for the success of this squadron and the comparatively small number of casualties which it suffered.

We must not spoil the market by telling too much of the story in this review, but we cannot resist one tale of Flt. Sub.-Lt. R. A. Little, flying a triplane near Arras. " One day, whilst on his own near Arras, he saw a two-seater enemy machine doing artillery work. After firing a few rounds at it he had a gun jamb. He tried to clear it and failed, but, instead of going away and leaving the fellow to carry on his work undisturbed, he decided to act as though his gun was O.K., and by constantly diving on the Hun, kept the observer busy firing at him instead of being able to get along with his proper job. His dives and zooms away were so persistent and annoying that the Hun soon tired of the game and cleared off." Such an act is a fine example, not only of cold courage, but of appreciation of the duty of an Army fighter. Some pilots in the war fought for their own bag. Flt. Sub.-Lt. Little took this risk to save some Army unit from artillery fire. Shortly afterwards he received a bar to his Distinguished Service Cross and the French Croix de Guerre. Before the end of 1917 he had added a Distinguished Service Order, and then a bar to that. His name does not appear in the casualty list of the squadron.

F. A. DE V. R.

A Gospel of Speed

" Speed," by Frank Hawks (published in New York by Brewer, Warren & Putnam). Obtainable from FLIGHT *Office.*

FRANK HAWKS has written a book which, it is to be hoped, everyone connected with aerial transport in this country will have the opportunity of reading.

Since his high-speed records, Hawks' name has naturally been synonymous with speed flying, but, generally speaking, only those who have the pleasure of knowing him personally have realised that such flying had for its underlying motive the furtherance of commercial flying as opposed to pure and simple record-breaking flights.

The book lays bare the very soul of Frank Hawks, and shows that if ever a man had flying in his blood, then he has. In many ways he is a revolutionary, and at the

beginning he demonstrates his ability to think for himself by stoutly maintaining that, in spite of what some designers of to-day are so fond of claiming, there is little in common between the aircraft and the bird.

The opening chapters are devoted to pointing out just what speed means to aerial transport, and, as one would naturally expect, Hawks stresses the fact that now that America has awakened to the necessity for utilising the speed of aircraft, she has developed air lines whose cruising speeds are from 50 to 100 per cent. greater than those in general use in Europe. At the same time, he is perfectly just, as he points out that conditions in the U.S.A., where Customs difficulties are non-existent and where the train services are faster than those over here, make fast air travel a *sine qua non*, if it is to be any use at all, in competing with existing methods.

In fact, he visualises cruising speeds of some 200 m.p.h. as the general thing for American air lines before very long. An interesting point is raised here. It is that by 200 m.p.h. cruising speeds Hawks says he does not mean the speed at full throttle, but with the engine running at its most economical setting. The term cruising speed is used far too loosely in this country, and it is well that there should be some uniformity as to its meaning. Some take it to mean the speed at $\frac{2}{3}$ throttle opening, others $\frac{3}{4}$ and so on. Some even thus: "Oh! just the machine's comfortable speed." That sort of thing is not good enough, particularly for serious commercial work, and we should do well to watch the French, who are making a particular feature of the fuel consumption of their engines at cruising revolutions.

Hawks can advance many reasons for increasing the cruising speeds of air travel. He contrasts the long night journey in a sweltering train with a short daylight trip after office hours which will be possible between such cities as New York and Pittsburgh, Cleveland or Buffalo . . . he points out that faster travel will help absorb some of the time lost in travelling between the airports and the business parts of the cities . . . he reminds operators that the 400 hrs. which normally elapse between engine overhauls represent some 80,000 miles flying for the 200 m.p.h. aircraft as against 40,000 miles for the 100 m.p.h. aircraft. Further, this increased mileage is obtained without any greater wear and tear on the engine. . . . Weather conditions, when adverse, may also be made less so in the aircraft which cruises at high speed as the time between landings is much shorter, therefore there is less likelihood of the weather changing during the trip, also the fast aircraft can afford to skirt bad weather areas and still arrive ahead of other means of transport.

It is interesting to note that Frank Hawks, although the most prominent speed pilot over long distances, is also an enthusiastic glider pilot, and it is to this branch of flying that he looks to fulfil the wants of those who fly merely for the exhilaration of flying.

He refers to safety as something which is now taken for granted owing to the stringent regulations of the aeronautics branch of the Department of Commerce. He forgets, however, to mention that those same regulations are a comparatively recent innovation for the drawing-up of which the immense past experience gained from the operation of our own regulations was available.

The saving effected in interest on money transferred from one bank to another, when this is delivered by high-speed air mail, he estimates at ten billion dollars every year. We ourselves already utilise air lines for this same purpose, but probably not to the same extent.

After the first chapters of the book comes Hawks' own account of the record trips which he has made across the Continent. These make good reading and are packed full of interesting details. Following these comes a history of Hawks' life. Those who have had the pleasure of hearing Hawks talk can rest assured that he has written his book exactly as if he were talking, and it is, therefore, the most entertaining and informative autobiography I have read this year.

He starts from, as he himself puts it, "the mists into which memory tapers off" (how typically Hawkslike is such a phrase!) and finishes just as he is about to pay his visit to this country. He tells of the hard times he had, without asking for sympathy, for his is a nature which more readily gives of that commodity than takes it from others, but his struggles will make everyone glad that he has at last attained a position such as his unique qualities warrant.

Many incidents are of such outstanding interest that I feel tempted to quote from the book at length were it not for the fact that once started it would be difficult to call a halt. Readers will learn that Hawks accomplished the first refuelling-in-the-air flight . . . that he was for some time a driller on an oil well . . . and so on, every chapter being packed with interest.

It is characteristic of the man, whose smile is now proverbial on both sides of the Atlantic, that he should round off his book with a note as to the inspiration he gains from the enthusiasm of the young boy for aviation. . . . boys "who will be making the pilots of tomorrow and helping our aeronautical dreams of to-day become realities."

"DAEDALUS."

The "Bristol Review"

THE latest issue of the *Bristol Review* is of more than usual interest, and marks a departure from previous issues, in that it is devoted exclusively to "Bristol" aircraft. The first article, short though it is, is remarkable because it reminds the reader that this famous firm has now been in existence for 21 years and has attained its maturity. A descriptive article on the type 118 General Purposes aircraft covers much the same ground as the article on this machine published in FLIGHT last week. "Bristol" metal constructional development is well explained and illustrated in quite a long article, in which one seems to trace the hand of Mr. Pollard, and some details are given of the multi-spar wing with which the firm has been experimenting for a considerable time. The "Bristol" Flying School has an article devoted to it, and certain features of the famous "Bulldog" are fully explained and well illustrated, mainly such of its special features as the placing and handling of the equipment. An article on electrical equipment is of general interest, although it deals mainly with "Bristol" aircraft. Finally, users of "Bristol" steel aircraft will find instruction and information in the last article, which relates to the simplicity of repairs. The *Review* is altogether admirably produced, and readers wishing to have a copy are well advised to write for one to the Bristol Aeroplane Company, Filton House, Bristol.

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R.A.F. Flying Instructors

AN Air Ministry Order states that the Air Council has decided, as an experimental measure, to draw candidates for training as flying instructor so far as possible from officers and airman pilots who have completed four years' flying service after qualifying as pilot, instead of, as at present, from officers and airman pilots who have completed one year's service after qualifying. This step should sensibly improve the standard of flying efficiency to be expected among instructors. Since flying instructors are required to serve for three years as such after qualifying at the Central Flying School, the decision given above will involve their being selected from (i) permanent officers, (ii) short service officers selected for permanent commissions, other than as specialists, (iii) short service officers selected for medium service, (iv) airman pilots willing to extend their flying service to eight years in all. To the extent that the numbers available under (i), (ii) and (iii) do not suffice to meet requirement of officer instructors, it will be necessary to select officers who have completed one year's service after qualifying as pilot; such selections will be limited to short service officers, and it is anticipated that the number required will be very small. In selecting short service officers for permanent commissions, other than as specialists, and in selecting short service officers for medium service, preference will be given to candidates volunteering and suitable for training as flying instructor.

The establishment of flying instructors at the flying training schools, the Central Flying School, and the Royal Air Force College will be slightly varied so as to allow of 35 per cent. of the instructor posts being filled by airman pilots. The number of flying instructors to be trained during 1932 will be 65, of which number approximately 40 will be flying officers and 25 airman pilots.

Mr. Wingfield and the G.A.P.A.N.

WE are glad to find the report of Mr. Wingfield's resignation from the Guild of Air Pilots and Air Navigators is inaccurate, as it would have been a great loss to the Guild, his work during the last two years having done so much towards the success of the Guild. In fact, he is keener than ever on the work.

Wheel Brakes and Undercarriages

MR. S. SCOTT-HALL, M.Sc., D.I.C., A.F.R.Ae.S., read a paper under this title before the Royal Aeronautical Society on December 3. Mr. Scott-Hall is, as many of our readers will know, one of the Technical Officers at the Aircraft and Armament Experimental Establishment at Martlesham. His paper brought together for the first time in collected form a survey and comparison of the various existing aero wheel brake systems, and the latter section of the paper dealt with undercarriages in general.

Mr. Scott-Hall stated that it was only during the last year or so that the problems of wheel brakes for aircraft had been tackled seriously. The problems facing the designer at the present time who wishes to equip an existing aircraft with wheel brakes are as follows:—1. What alterations, if any, are necessary to the undercarriage? 2. What method of operation is to be employed by the pilot? 3. How is the pilot's effort to be transmitted to the brakes? 4. What type of brake is to be used? The first problem could be sub-divided into: (*a*) The position of the undercarriage; (*b*) the provision of means for taking the brake torque.

Position of Undercarriage.—It was fear of overturning which delayed the installation of brakes for so long. This fear, the lecturer said, is still considerable, and has led to undercarriages being placed so far forward as to cause excessive tail loads and difficulties in taxying and taking off. Theoretical considerations had led to a criterion for the angle between the vertical and a line joining the point of ground contact of the wheels to the centre of gravity of the aircraft. This criterion was that for immunity from overturning this angle must not be less than $\tan^{-1} \mu$, where μ is the coefficient of friction between tyres and ground. Mean results of test landings gave 0.31 as the value of μ. The highest value obtained was 0.40. These values correspond to angles of 17 deg. and 22 deg. respectively.

It had been found that when an aircraft had a tendency to overturn, it would do so not on touching nor during the initial part of the run, but when the speed had dropped to some 20 m.p.h. This was because during the first part of the run the aircraft was largely airborne and the wheels merely skidded. Towards the end of the run the aircraft was no longer airborne, and the braking effect was much greater. Brake tests on a number of aircraft had indicated that if the critical angle was 20 deg. or more, there was no undue tendency to overturning.

The Four-wheeled Undercarriage.—For very large aircraft a type of four-wheeled undercarriage with two units, each of which had two wheels mounted in tandem, had interesting features. The shock absorber leg was pivoted to the central point of the carriage, which was further positioned by a system of "N" struts. This type of undercarriage was very stable and decreased tendency to overturn.

Brake Torque Reaction.—When brakes were first fitted to existing undercarriages, additional members were inserted to take brake torque reaction, usually tension members running from the radius rod anchorage to the rim of the brake backing plate. In initial designs better schemes were provided. One of the most popular was to strengthen the radius rod itself and attach it to the backing plate in such a way that it took the torque in bending.

Method of Operation.—When landing, the pilot had much to occupy his attention. During landing and manœuvring on the ground, a pilot's hands were employed with the control column and throttle respectively. For large civil aircraft it was not essential that one hand should be actually on the throttle the whole time, and thus a hand brake control was possible. For landing and taxying in formation, and for deck landing, both hands were engaged continuously.

Hand Control for Civil Aircraft.—When hand control was used, this consisted of a lever placed adjacent to the throttle control. Backward movement applied both brakes, while a sideways movement or a twist produced differential application.

Foot Control.—The most popular of these was provision of toe pedals on the rudder bar. This scheme met military requirements better than any others tried, and was satisfactory except where the rudder bar had a large travel, when the toe pedals became awkwardly placed. With toe pedals fitted, an adjustable rudder bar was very necessary, because the best position for braking was not comfortable for flying. Heel control of similar type had been tried, but gave awkward movements. The lecturer then referred to the method evolved by Mr. H. L. Stevens, in which a double rudder bar is fitted, the rear one being capable of forward movement against pressure of springs.

Combined Hand and Foot Control.—Mr. Scott-Hall referred to combined systems of control, in which the brakes were applied when the stick was pulled hard back, and differential control was supplied by the normal rudder movement. He did not consider this a good system, and quoted the case of the tail skid hitting an excrescence on landing. To prevent nosing over, the pilot would hold the elevators hard up, and in so doing would apply the brakes, which, in fact, ought to be released.

The lecturer then referred to the Knorr brake, a German system in which the brakes are operated by the movement towards closed position of the throttle lever, a gate enabling the lever to be moved still farther back, thereby operating the brakes together. One drawback with this system was that the engines could not be run up with brakes on, and chocks had to be used.

Automatic Controls.—Methods for releasing the brakes when the tail was off the ground were easy to incorporate when a hydraulic system was used. In another type, the axles were mounted in sloping slots, so that, as long as the wheels took the normal static load and the tail was on the ground, the axles were in the upper forward end of the slots. When the tail came up, the wheels travelled aft and downwards. This movement was arranged to release the brakes. The pilot's control consisted in an over-riding mechanism to release the brakes for taxying.

Systems of Transmission.—Experience had been gained with three methods so far, viz., (1) Cable (Bowden or plain); (2) Hydraulic; (3) Pneumatic. Cable transmission had the drawback that it could only be used with mechanical brakes, and it required continual adjustment for stretch. Hydraulic transmission with oil as the working fluid was not quite so reliable in action. Its sweeping advantage lay in the fact that adjustments were rarely needed, and the actual brake used could be of the mechanical shoe or Palmer expanding type, whichever was preferred. The pneumatic method suffered from the same disadvantages as the hydraulic, but in a worse degree. It would appear that the hydraulic or pneumatic methods would be the most popular in the future, with a slight balance in favour of the pneumatic.

Types of Brakes

A number of widely-differing types of wheel brake were in use. All except one were designed for disc or spoked wheels fitted with high-pressure tyres. They were of the following types: (*a*) Internally expanding independent shoe; (*b*) Servo shoe; (*c*) expanding tube; (*d*) multiple disc. The one exception was the sleeve type brake designed for use with low-pressure air wheels.

The Internally Expanding Shoe Brake.—Under this type the lecturer referred to two concrete examples, the Lockheed hydraulic brake, and the Vickers self-energising brake. Both made use of two independent shoes, but whereas in the Vickers type the hydraulic pressure was raised by means of the rotation of the landing wheel itself, in the Lockheed it had to be provided externally.

The Servo Shoe Brake.—In this, the frictional load on the primary shoe was used to apply the secondary shoe. The number of shoes might be increased to three, but trouble then arose due to uneven wear. The action of a Servo brake was likely to be affected to a greater extent by the presence of oil than one of the independent type.

Expanding Sleeve Brake.—The small diameter available for brake installation was made up for by the much greater width available. It was apparently tacitly assumed that aircraft brakes did not overheat, owing to the short period in use. This was not correct, and better provision should be made for dissipating the heat generated.

Multiple Disc Brake.—Under this heading Mr. Scott-Hall referred to the Sikorsky unit, which consisted of two discs of the same diameter as the rim of the wheel, running between stationary discs mounted on the axle. Hydraulic pressure was applied to the stationary discs, tending to clamp the rotating members between them. The method provided much better heat dissipation, but at the expense of additional drag.

Expansion Tube Brake.—The lecturer placed in a class by itself the expansion tube brake, as exemplified by the

Palmer brake, of which he said that it could be used with either oil or air operation, was extremely simple and light, did not require accurate concentricity between brake drum and axle, and utilised the whole available area of the brake drum. For hydraulic operation a special oil was used (a mixture of glycerine and methylated alcohol) which had no deteriorating influence on the materials of the expansion tube. For pneumatic operation it was at present necessary to carry a compressed-air cylinder with a normal working pressure of 100 lb./sq. in.

Results of Tests.—Results of extensive handling trials were scattered, but there was a tendency for the reduction of the landing run to increase with increase of total weight of aircraft.

Drag and Weight.—As all brakes were housed within the wheels, there was little or no additional drag. The additional weight was of the order of 1 per cent. of the total weight of the aircraft.

General Undercarriage Developments

Turning to the general subject of undercarriage development, Mr. Scott-Hall recalled that measurements made during tests on a D.H.9 aeroplane indicated that the maximum vertical velocity in a purposely severe landing was 9.3 ft./sec., and the maximum acceleration 4.1 g. The maximum vertical acceleration taxying on rough ground was 3.1 g. Experiments by the American N.A.C.A. gave maximum results of 3.6 g. for rubber cord gear and 2.3 g. for an oleo gear under severe landing conditions. In tests on a machine with Goodyear air wheels inflated to 15 lb./sq. in. a maximum acceleration of 4.3 g. was recorded, the vertical velocity of the aircraft being 9.4 ft./sec. With the inflation pressure reduced to 5 lb./sq. in. the maximum acceleration was 3.2 g., with a vertical velocity of 10.5 ft./sec. All the experiments brought out the fact that taxying loads on rough aerodromes were comparable in magnitude with those produced by all but the most severe pancake landings.

It was regarded by some as being desirable that the first part of an aircraft to break should be the undercarriage. This was only true if it could be assured that when the undercarriage failed the machine would not turn over. Unfortunately, it usually did.

Oleo Legs.—The lecturer then described several oleo legs, but as most of these have been described in FLIGHT, it is thought unnecessary to repeat the description here.

In describing briefly methods used at Farnborough for testing oleo legs, Mr. Scott-Hall said that the load in falling was made to compress air in cylinders during the last portion of the drop, thus allowing for the fact that the aircraft, when landing, is partially airborne. The elastic effect of tyre and axle, and the inertia of the moving parts, were also represented.

Taxying Qualities.—One of the greatest difficulties in the design of shock absorber legs was to provide good taxying qualities in combination with the ability to absorb the shock of a heavy landing. The question was largely bound up with the amount of damping of the oil which should be restricted under taxying conditions, but even more concerned with the capacity and deflection rate of the springing medium.

Track.—A wide track undercarriage enabled a softer, longer travel leg to be used, applying brake on one side required less effort at the wheels, and taxying across wind became easier.

Divided Undercarriages.—A wide track undercarriage necessitated a divided undercarriage, and this might bring difficulties of structural arrangement. A divided undercarriage was a help in taking off and landing cross-wind, but heavy lateral loads might be imposed on the wheels in a pancake landing.

Undercarriage Drag.—The lecturer pointed out that tests carried out by the American N.A.C.A. on a "Sperry Messenger" showed the undercarriage to be 40 per cent. of the total drag of the full-scale aircraft with wings removed. Later tests, on a Fairchild cabin monoplane, gave a figure of 25 per cent. of full-scale machine without wings. Lack of a large wind tunnel had delayed research in England, since interference played a big part in increasing resistance. Mean figures for undercarriage drag gave about 15 per cent. for straight-through axle types and slightly less for divided undercarriages. Wind tunnel tests on a 1/24th scale model twin-engined monoplane with "trouser fairings" showed a reduction in drag coefficient of the model from 0.0310 to 0.0287, which was equivalent to a reduction of 30 lb. drag at a speed of 100 ft./sec. full scale. The airscrews were not running, and the lecturer thought scale effect was probably large, but he gave the results for what they were worth.

Wheel Fairings.—Of "spats" Mr. Scott-Hall said that on a recent full-scale test of a single-seater biplane of 3,500 lb. all-up weight, an increase in top speed of 3.2 per cent. was obtained. The weight was only 30 lb., and little trouble had been experienced in maintenance.

The Internally-sprung Wheel.—Referring to the Dowty internally-sprung wheel (described in FLIGHT recently), the lecturer said that the main disadvantage was that the minimum diameter was limited by the travel required on the shock absorbing mechanism, and the wheel was therefore only really suitable for use with high-pressure tyres.

Retractable Undercarriages.—For aircraft where level speed performance was all-important, the retractable undercarriage was the final answer to the problem of drag.

The Low-pressure Wheel.—Referring to the Goodyear "doughnut" wheel, Mr. Scott-Hall said that the lower internal air pressure made for better cushioning when landing, but the actual energy-absorption qualities were not as great as was originally thought. The greater ground contact area made operation on soft or sandy aerodromes very much easier, and taking off and landing had been done successfully with these tyres fully deflated. The drag of the low-pressure wheels was no greater than that of corresponding high-pressure tyres, due probably to their somewhat better aerodynamic shape.

Tail Wheels.—The fitting of wheel brakes had made the tail skid obsolete except for light aircraft. The problems of the best type of unit and its position in the fuselage had not been fully solved. For best controllability when taxying, the wheel should be as far aft as possible, although this might not fit in with other considerations. The amount of castoring freedom was open to discussion. A 360-deg. castor and constraining springs was a favoured arrangement, with a release to throw the springs out of action for manhandling on the ground. To prevent excessive bouncing, a very low pressure wheel was indicated, with carefully designed shock absorbing and damping mechanism. Too small an angle between the castoring axis and the ground might cause severe wobble. For best results this angle should lie between 75 and 85 deg.

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The Safety-seekers

BY a somewhat curious coincidence, the artist's impression of a machine combining the features of the Autogiro, the Pterodactyl and the tail-first aeroplane, published in FLIGHT on November 27, has proved, if not prophetic, at any rate appropriate. The news has just reached us from Germany that the Focke-Wulf Flugzeugbau A.G., of Bremen, has concluded an agreement with the Cierva Autogiro Co., Ltd., to begin construction under licence of a "windmill" machine. It is not, of course, the intention of the Focke-Wulf Company to combine the Autogiro with the "Ente" type, but at least it is significant that the German aircraft firm which, more than any other, has endeavoured to produce safe and non-spinning aeroplanes, should have turned to the Autogiro as a part of their experimental development programme. The first machine to be built under licence by the Focke-Wulf Company will be a type C.19, incorporating all the latest features, such as three-bladed cantilever rotor, folding rotor blades, and engine-driven starting of the rotor. The machine is to be fitted with a Siemens Sh-14 engine of 100 b.h.p.

Auxiliary Air Force

ON being reappointed Under-Secretary of State for Air, Sqd. Ldr. Sir Philip Sassoon resigned the command of No. 601 (County of London) (Bomber) Squadron, and was succeeded by Sqd. Ldr. S. B. Collett. This officer has now been transferred to the command of No. 600 (City of London) B.S., which was rendered vacant by the completion of his tenure by Sqd. Ldr. (now Air Commodore) F. E. Guest. The command of the County of London Squadron has accordingly devolved on Flt. Lt. H. N. St. V. Norman, who has been promoted to squadron leader. Those who have observed the capacity with which Sqd. Ldr. Norman has managed the affairs of Heston Air Park will feel sure that No. 601 B.S. may be heartily congratulated on its new commanding officer. The same may be said of No. 600 B.S.

"THE TRADE" DINES AT MARTLESHAM

THAT the reports on aircraft given by the Aeroplane and Armament Experiment Establishment, Martlesham Heath, Suffolk, are now accepted the world over as unchallengeable no one will deny. If Martlesham "says so, it *is* so," and no arguments about it. The foreigner, if he thinks about it at all, is probably under the impression that such a state of affairs must of necessity mean that the poor British aircraft constructor lives in fear and trembling of Martlesham and its officers. Could he have been present at the annual dinner given by Wing Com. Field and his officers on December 4 to members of the aircraft industry, the foreigner would have discovered that Martlesham and the poor B.A.C. are on the best of terms, and that the relationship between the aforementioned B.A.C. and Martlesham's officers is rather that of various members of a large family. Like members of a family, the industry and Martlesham are very critical of one another. Secretly there is much admiration, but it is an admiration well and carefully concealed. Not for worlds would one member of the family let another feel his admiration, but it is there just the same.

In proposing the toast of "The Guests" at last Friday's gathering, a gathering, by the way, which was larger then ever, Wing Com. Roger M. Field, C.O., of Martlesham, gave voice to something of this feeling. He was, he said, very glad indeed to welcome that evening so many captains of the British aircraft industry. Martlesham held a position which he thought was unique. No other unit in the world could do what Martlesham did in the same way. The world in general accepted Martlesham figures as being unassailable. That position had only been reached by the strictest insistence upon truth and rectitude. Martlesham had to be harsh, perhaps, but also severely just. He was glad that this made no difference to the friendship between Martlesham and the aircraft industry. With becoming modesty Wing Com. Field said that of the two the industry had the harder task, since it had to produce while Martlesham had only to test. He was convinced that the aircraft industry did its level best to produce a good thing, and did it honestly, and very often it was very difficult for Martlesham to select the best.

Mr. F. Handley Page said it was his proud privilege to reply for the guests. He stressed the fact that in dining there that evening the guests all felt that they were among friends. It was a commonplace to thank people for the very nice way in which they had been welcomed, but on this occasion the saying was quite sincerely meant. He was not, that evening, going to refer to slots, as he believed another speaker would refer to this aid to safety, but he *would* ask them to look at the wing tips of the eagle on the menu, and he would ask them whether these did not remind them of something. He would like to take the opportunity of welcoming one newcomer, Maj. J. S. Buchanan. He singled out Maj. Buchanan because he had recently stepped into a new job. They were all aware that some time ago Maj. Buchanan was cast out into the outer darkness—Farnborough. He had to stay more than three days, but he had returned, and they were glad to welcome him not as a newcomer but as a very old friend.

Air Marshal Sir John Higgins confirmed that the whole of the British aircraft industry was convinced that Martlesham was a real hall mark. Martlesham's decisions were invariably honest and true, and the industry accepted them without question. He had, he said, learned with regret that Mr. Stevens (Principal Technical Officer at Martlesham) was leaving. The aircraft industry had always received great kindness from Mr. Stevens, who had worked very hard and helpfully in improving the breed of British aircraft. His leaving would be a great loss, and they would all wish to thank Mr. Stevens for what he had done for the industry. In conclusion he would like to say how much the aircraft industry appreciated this opportunity to meet old friends.

Sir Robert McLean complained that previous speakers had left him nothing to say, and he could only repeat what he had said at the last Martlesham dinner, namely, that the industry had great confidence in Martlesham, and he was glad of the opportunity of saying so a second time.

Air Vice Marshal Dowding (Air Member for Supply and Research) said that when he accepted the invitation to attend the dinner he felt like Daniel in the lions' den. However, he was glad to find that it was not so bad after all. He referred to the troublous times in which they were living, and said that on every hand they were being instructed to turn their swords into plough-shares and were busy doing so. The trouble seemed to be that when it had been done it was found there was no money to buy plough-shares with. He recalled a song popular some time ago, the refrain of which was to the effect that "There's a good time coming, be it ever so far away." That was the outlook to adopt in aviation, and he suggested the author of that song should have his name blazoned in gold for all to see. He was personally looking forward to the time when might be heard in the streets a remark like the following: "See that man? 'Normously wealthy. Buys a new razor blade every day. He is an aircraft constructor." He hoped that would come about some day.

After the very excellent dinner the company were informed that those who wished to do so might go into another room to see a film which Mr. Lappin, of the Rolls-Royce firm, had prepared, a film showing the preparations for and actual flying of the Schneider Contest, as well as a film showing *Miss England,* Lord Wakefield's famous motor boat. The film, although of the small variety (16 mm.), was, in fact, excellent, and Mr. Lappin is to be congratulated on his photography, while the reversibility of the projector enabled him to add a humorous touch by occasionally running a section of the film backwards, causing flying-boats to take off tail first and Orlebar to walk down the slipway at Calshot in the same manner. Boothman, who was present, seemed to enjoy certain sarcastic comments.

APPROVED INSPECTORS' DINNER

AN "Approved Inspectors' Dinner" was held at Sheffield on December 4 for the purpose of bringing together in social circumstances the approved inspectors and members of the Aeronautical Inspection Directorate in the Sheffield district. The gathering, over which Mr. Leslie Sherratt, who is in charge of the A.I.D. Northern Office, presided, proved to be even more important than expected, as no less than 150 guests were present, including the directors of several Sheffield companies. An interesting *résumé* of the "Approved Inspectors" system was given by Lt. Col. H. W. S. Outram, C.B.E., Director of the A.I.D., when he proposed the toast to the A.I.'s. They had learned from the war two great lessons on the question of aeronautical inspection of material, he said. One was the difficulty of making certain that every bit of material met the specification, and the other was how to inspect that material in the manufacturing process.

After the war the work began to be spread over a large number of firms, and the Air Ministry was faced with three alternatives: (*a*) Inspection could be made after the material had been delivered at the aircraft manufacturers' works, which meant that it was not inspected in the making. (*b*) They could station an A.I.D. staff at each works, which had the disadvantage of being costly. (*c*) They could restrict the supply to certain firms, and this might have been done if they had only to deal with Air Ministry contracts.

But then the firms themselves began to recognise that inspection during manufacture was essential, and so the Air Ministry had to consider whether they could not make use of the firms' own inspection. It was then decided to approve the firms' inspection staff.

By 1926 Sheffield (and district) companies with approved inspectors totalled 94. By 1929 the total had risen to 177, when it was necessary for the Air Ministry to open another office at Manchester; and now they were thinking of opening a third in Leeds—though the Treasury would have something to say about that first!

The difficulties which might have been expected with this system had never really materialised, said Col. Outram, and for two reasons: The Air Ministry always had A.I.D. men available for a consignment about which there was any doubt, and the difficulty of serving two masters, as approved inspectors did, had not arisen. At least, no case of that sort had come to his notice.

As an instance of the success of placing this responsibility for inspection upon the manufacturers, he mentioned that between January and October of this year 15,000 release notes were issued by the firms, and there were only

16 cases of complaint that could be traced to inspection. That, he said, was proof positive that the system, as a system, was successful. The number of approved inspectors in the Northern Office employed by firms was now approximately 290, as against only nine employed by the A.I.D. Of the 290 about 85 were on full time.

Speaking of the future, Col. Outram said that there would be an increased use of the highest grades of material.

New aircraft developments would come hard upon steel firms, and the inspectors' jobs would become more and more difficult; but it was only because the firms had always provided the required material that British aircraft and British engines had become pre-eminent. Because of their superiority of design and workmanship British aircraft and engines could always demand a higher price, but he also declared that the price of them had got to come down. Speaking of the foreign market, he said that he believed there was a considerable market for our aircraft material abroad if firms studied and supplied material to foreign specifications.

The reply to the toast was briefly made by Mr. J. Wortley Fawcett, Director of Thomas Firth & John Brown, Ltd., who remarked that outside the industry the expense of inspection shouldered by the steel firms was not appreciated, and by Mr. David Flather, Director of W. T. Flather, Ltd., who emphasised the contribution of steel makers to the success of the inspection system, and finally by Mr. G. E. Baxter, an approved inspector, who made the original suggestion which resulted in the Approved Inspectors' Dinner.

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THE ROYAL AIR FORCE

London Gazette, December 1, 1931

General Duties Branch

The follg. are granted short-service commns. as Pilot Officers on probation with effect from and with seny. of Nov. 17:—F. B. Bristow (Flying Officer, Special Reserve); C. C. McMullen. R. Macfarlan is granted a short-service commn. as Flying Officer on the Supplementary List (Nov. 18); G. L. Best is granted a permanent commn. as Pilot Officer with effect from Nov. 26, and with seny. of Nov. 26, 1930. The follg. Pilot Officers are promoted to rank of Flying Officer:—W. E. Rankin (Aug. 28); D. D. Christie, H. V. Satterly, W. C. Sheen (Nov. 19).

Flying Officer D. H. A. Golege-Steel takes rank and precedence as if his appointment as Flying Officer bore date March 28. Reduction takes effect from Oct. 19; Flying Officer E. C. Bates takes rank and precedence as if his appointment as Flying Officer bore date Oct. 6. Reduction takes effect from Oct. 19: Wing Commander A. F. A. Hooper, O.B.E., is placed on half-pay list, scale A (Nov. 20). The follg. Flying Officers are transferred to Reserve, Class A (Nov. 30):—C. E. Kay, H. F. Suren.

Stores Branch

Flight-Lieut. H. A. Williams is placed on retired list (Nov. 28).

Medical Branch

Flying Officer H. T. Rylance, L.M.S.S.A., relinquishes his temp. commn. on completion of service (Nov. 19).

ROYAL AIR FORCE RESERVE
RESERVE OF AIR FORCE OFFICERS

General Duties Branch

The follg. are transferred from Class A to Class C:—Flight-Lieut. H. C. Todd (Nov. 11, 1930); Flying Officer D. J. Stewart (July 25).

The follg. relinquish their commns. on completion of service and are permitted to retain their rank:—Flight-Lieuts. D. Craik, D.F.C. (Dec. 19, 1930); C. D. Spiers (Sept. 13). Flying Officer H. W. Westaway (Aug. 27).

Stores Branch

Squadron Leader W. L. Shaw, M.B.E., relinquishes his commn. on completion of service (June 17); Flying Officer R. Q. Bamber relinquishes his commn. on completion of service and is permitted to retain his rank (June 17).

Medical Branch

Flying Officer M. D. Rawkins, M.B., B.S., is transferred from Class D (ii) to Class D (i) (Sept. 17).

SPECIAL RESERVE

General Duties Branch

D. R. P. Mills is granted a commn. as Pilot Officer on probation (Nov. 13). The follg. Pilot Officers on probation are confirmed in rank:—F. L. D. Salter (July 6); W. Humble (Oct. 25). Flight-Lieut. F. Davison resigns his commn. (April 15); Flying Officer F. B. Bristow relinquishes his commn. on appointment to a short-service commn. in the R.A.F. (Nov. 17).

AUXILIARY AIR FORCE

General Duties Branch

No. 600 (City of London) (Bomber) Squadron.—Squadron Leader the Rt. Hon. F. E. Guest, C.B.E., D.S.O., M.P., is appointed Hon. Air Commodore on relinquishing command of the Squadron (Nov. 19); Squadron Leader S. B. Collett to command the Squadron on transfer from No. 601 (County of London) (Bomber) Squadron (Nov. 19). No. 601 (County of London) (Bomber) Squadron.—Squadron Leader S. B. Collett to be transferred to No. 600 (City of London) (Bomber) Squadron to command (Nov. 19); Flight-Lieut. H. N. St. V. Norman to be Squadron Leader and to command the Squadron, vice Squadron Leader S. B. Collett (Nov. 19); P. J. Clive to be Pilot Officer (Sept. 27). No. 602 (City of Glasgow) (Bomber) Squadron.—Flight-Lieut. J. S. Lennox resigns his commn. (June 16).

No. 604 (County of Middlesex) (Bomber) Squadron.—M. D. Doulton to be Pilot Officer (Sept. 29).

Accountant Branch

No. 603 (City of Edinburgh) (Bomber) Squadron.—Flying Officer J. L. Jack, M.C., to be honorary Flight Lieut. (Dec. 2).

Medical Branch

No. 602 (City of Glasgow) (Bomber) Squadron.—Flight-Lieut. J. C. H Allan, M.B., to be Squadron Leader (Aug. 26).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Wing Commanders: C. W. Nutting, O.B.E., D.S.C., to H.Q., Air Defence of Gt. Britain, Uxbridge, for Air Staff (Signals) duties, 28.11.31. D. Iron, O.B.E., to H.M.S. *Furious*, for duty as Senior Air Force Officer, 28.11.31.

Squadron Leaders: R. V. Goddard, to Home Aircraft Depot, Henlow, 1.12.31. J. A. W. Binnie, to R.A.F. Depot, Uxbridge, 25.11.31. L. M. Iles, A.F.C., to Aircraft Depot, Hinaidi, Iraq, 27.11.31.

Flight Lieutenants: H. M. Whittle, to R.A.F. Depot, Uxbridge, 28.10.31. C. J. W. Hatcher, A.F.C., to Aircraft Depot, Hinaidi, Iraq, 9.11.31. R. C. Savery, D.F.C., to Station H.Q., Hinaidi, Iraq, 27.11.31. W. Sanderson, A.F.C., to No. 6 Sqdn., Ismailia, Egypt, 28.11.31. I. J. Fitch, to No. 208 Sqdn., Heliopolis, Egypt, 28.11.31. J. B. Lynch, to Aircraft Depot, Hinaidi, Iraq, 27.11.31.

Flying Officers: W. S. C. Adams, to No. 84 Sqdn., Shaibah, Iraq, 3.11.31. R. J. Cohen, to Aircraft Depot, Hinaidi, Iraq, 5.11.31. M. H. Clare, to No. 210 Sqdn., Pembroke Dock, 24.11.31. R. Macfarlan, to H.Q., R.A.F., Transjordan and Palestine, Jerusalem, 27.11.31.

Stores Branch

Group Captains: G. Laing, C.B.E., to Air Ministry (D. of E.), on appointment as Deputy Director of Equipment, 1.12.31. W. R. Bruce, O.B.E., to R.A.F. Depot, Uxbridge, 1.12.31.

Flight Lieutenant: R. T. Rich to Station Administration, Halton, 3.12.31.

Accountant Branch

Flying Officers: D. Sender, to No. 30 Sqdn., Mosul, Iraq, 13.10.31. G. H. White, to Station H.Q., Hinaidi, Iraq, 5.11.31. M. L. Jones, to No. 84 Sqdn., Shaibah, Iraq, 26.10.31.

Medical Branch

Squadron Leaders: R. A. G. Elliott and G. H. H. Maxwell, to R.A.F. General Hospital, Hinaidi, Iraq, instead of to H.Q., Iraq Command, as previously notified, 24.10.31. W. E. Hodgins, to R.A.F., General Hospital, Hinaidi, Iraq, instead of to H.Q., Iraq Command, as previously notified, 16.10.31. J. Kyle, to Palestine General Hospital, Sarafand, 27.11.31. D. McLaren, to Air Ministry (D.M.S.), 27.11.31.

Flight Lieutenants: J. G. Russell, A. Dickson and J. MacC. Kilpatrick, to R.A.F. General Hospital, Hinaidi, Iraq, instead of to H.Q., Iraq Command, as previously notified, 16.10.31.

Dental Branch

Flight Lieutenants: P. M. Margand, to Station H.Q., Heliopolis, Egypt, 28.11.31. M. J. Pigott, to R.A.F. Depot, Aboukir, Egypt, 28.11.31.

NAVAL APPOINTMENTS

The following appointments have been made by the Admiralty.

Lieut-Comdrs.—J. F. M. Robertson (F/O., R.A.F.), to *Furious* (Dec. 19); and A. M. Kimmins (Flt. Lieut., R.A.F.) and T. O. Bulteel (Flt. Lieut., R.A.F.) to *Furious*. J. A. Garland, lent to R.A.F. (Dec. 30).

Lieut. (Flt. Lieut. R.A.F.).—J. I. Robertson, to *Furious* (Dec. 17).

Lieuts. (F/O. R.A.F.).—J. A. L. Drummond, T. G. Carey, G. Willoughby, J. William Hale, O. S. S. Stevinson, and H. C. Ranald, to *Furious* (Dec. 17); H. D. Barlow, P. W. Humphreys, D. W. MacKendrick, W. G. C. Stokes, G. B. S. Slater, O. F. L. Bullock, J. Brett, V. J. Margetts, W. G. Williams, and G. D. Anderson, to *Furious*.

Sub-Lieuts. (F/O. R.A.F.).—V. D. Gask and C. L. G. Evans, to *Furious*.

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IN PARLIAMENT

Airship R.100

Sir P. Sassoon, in reply to Mr. Wells, said R.100 was offered for sale to Government overseas before the decision was taken to sell this ship for scrap.

Flying Clubs and Subsidy

Mr. Perkins, on December 2, asked the Under-Secretary of State for Air whether he is aware that a large number of flying clubs in this country have carried out their agreements with the Air Ministry; and whether he will differentiate next year, when considering the subsidy, between the clubs that have carried out their agreements and the companies that have failed to carry out their agreements?

Sir P. Sassoon: I am aware of the fact, and this and all other relevant considerations will be borne in mind in arriving at a decision as to future policy in regard to financial assistance to flying clubs after the end of July next.

MODELS

SOCIETY OF MODEL AERONAUTICAL ENGINEERS (S.M.A.E.)

THE annual distribution of cups and medals won during 1931 was held at the Y.M.C.A., Tottenham Court Road, London, W.C.2, on December 3. The Chairman, Dr. A. P. Thurston, in introducing Mr. Percival Marshall, M.I.Mech.E., said that the Society were very grateful to Mr. Marshall for coming along to present the prizes, and he thanked him on behalf of all interested in model aviation for the ready way in which he was always willing to help.

Mr. Marshall, replying, said that he very much appreciated the cordial relations that had existed between himself and the S.M.A.E. right from the formation of the Society. He thought that, although remarkable progress had been made in model aviation, aeromodellists were not yet half way to their goal, and that the striving for big "durations" was too much along one line. He therefore had one or two suggestions to offer from which he hoped something could be done that would stimulate interest in model aeronautics amongst the general public. He thought that more attention should be given to "speed" contests, even to the extent of trying actual racing by two or three machines together, also to the development of models driven by any other power than elastic. It did not seem to him that much had been done with this type of model since the war, although in pre-war days he well remembered Mr. H. H. Grove's success with his steam-driven machine. Also, he believed it might be possible to fly models on a circular course tethered to a pole, as done by "power-boat" enthusiasts, and also to experiment with radio-controlled models.

Mr. Marshall then presented the prizes to the following successful competitors:—

Gamage Cup	1st	A. T. Willis (T.M.A.C.)	Silver medal.
	2nd	D. A. Pavely	Bronze medal.
	3rd	G. F. C. Saunders (T.M.A.C.)	Diploma.
Kite and Model Aeroplane Association Cup	1st	W. E. Evans (Tied)	Silver medal.
	2nd	T. H. Ives (Tied)	Silver medal.
	3rd	Capt. C. E. Bowden	Diploma.
Pilcher Cup	1st	A. T. Willis (T.M.A.C.)	Silver medal and 10s.
	2nd	W. Davies (T.M.A.C.)	Bronze medal.
	3rd	A. M. Willis	Diploma.
Model Engineer Cup No. 2	1st	T. H. Ives	Silver medal and 10s.
	2nd	N. Peters (T.M.A.C.)	Bronze medal.
	3rd	H. J. Davies (T.M.A.C.)	Diploma.
"Flight" Cup	1st	A. T. Willis (T.M.A.C.	Silver medal and 10s.
	2nd	G. F. C. Saunders (T.M.A.C.)	Bronze medal.
	3rd	W. Davies (T.M.A.C.)	Diploma.
S.M.A.E. Speed Cup	1st	J. van Hattum	Silver medal and 10s.
	2nd	C. H. Debenham (T.M.A.C.)	Bronze medal.
	3rd	F. M. Hughes (T.M.A.C.)	Diploma.
Weston Cup	1st	A. M. Willis	Silver medal.
	2nd	A. T. Willis (T.M.A.C.)	Bronze medal.
	3rd	G. F. C. Saunders (T.M.A.C.)	Diploma.
Model Engineer Cup No. 1	1st	J. E. Pelly-Fry	Silver medal.
	2nd	G. F. C. Saunders (T.M.A.C.)	Bronze medal.
	3rd	A. M. Willis	Diploma.
Lady Shelley Cup	1st	A. M. Willis	Silver medal.
	2nd	T. H. Newell (T.M.A.C.)	Bronze medal.
	3rd	D. M. Dent (T.M.A.C.)	Diploma.
Freshman's Competition	1st	A. Gordon (T.M.A.C.)	£1.
	2nd	Mrs. Dennis (T.M.A.C.)	10s.
	3rd	E. H. Wheeler (T.M.A.C.)	7s. 6d.
Visitors Competition	1st	H. White (Unattached)	Membership and badge.
Farrow Shield Inter-Club	1st	Model Aircraft Club	Three silver medals.
	2nd	Bournemouth M.A.S.	Three bronze medals.
Civil Service Supply Association Cup	1st	A. T. Willis (T.M.A.C.)	Silver medal and 10s.
	2nd	A. M. Willis	Bronze medal and 5s.
	3rd	G. F. C. Saunders (T.M.A.C.)	Diploma and 2s. 6d.
Photographic Competition	1st	R. Langley	10s.
	2nd	W. E. Evans	5s.
	3rd	J. E. Pelly-Fry	5s.

Mr. G. R. Cook was also presented with a small token of appreciation from the Society for the amount of time and work he put in on the Society's stand at the "Model Engineer" Exhibition.

After refreshments had been servied, the meeting closed with a hearty vote of thanks to Mr. Marshall, proposed by Mr. A. F. Houlberg. S. G. Mullins, Hon. Sec., S.M.A.E., 72, Westminster Avenue, Thornton Heath, Surrey.

THE MODEL AIRCRAFT CLUB

A programme of competitions, etc., is being compiled for the 1932 season. The "Competition Secretary," T. Newell, 32, Veroan Road, Bexley Heath, Kent, will be pleased to receive early notification from Wing Commanders of any important local competition or event for which dates have been arranged for inclusion in this programme.

A Model Transport Exhibition.—The Club has been given a stand (about 300 sq. ft.) at the coming Model Transport Exhibition, Dorland Hall, Regent Street, S.W.1, which opens on January 6.

From one of your squadrons, A flight of identical machines (3) from various T.M.A.C. Squadrons would provide a very good exhibit. Will members please note?

Prizes will be awarded in each of the following classes:—1. Scale type copies of existing aeroplanes (Service or civil, flying or non-flying). 2. Original types, capable of full-size production (gliders come under this heading). 3. Flying model of any type (professional construction barred).

Just what the prizes will be has not yet been decided. Rest assured they will be well worth winning.

Another feature of the exhibition will be a range of flying models from pioneer days up to the present. Have members a good old "die-hard" in their possession, complete with a photograph?

Will members please communicate as early as possible what they can do to R. A. Yeomans, Hon. Organising Secretary, T.M.A.C., 2, Tenterden Drive, Hendon, N.W.4.

PUBLICATIONS RECEIVED

Flying Dutchman: The Life of Fokker. By Anthony H. G. Fokker and Bruce Gould. London: George Routledge & Sons, Ltd. Price 12s. 6d.

Report on the Progress of Civil Aviation, 1930. London: H.M. Stationery Office. Price 5s. 6d. net.

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AERONAUTICAL PATENT SPECIFICATIONS

(*Abbreviations*: Cyl. = cylinder; i.c. = internal combustion; m. = motors. The numbers in brackets are those under which the Specification will be printed and abridged, etc.)

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